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WESTERN WATER BULLETIN 1990

**Flow of
The Colorado River
and other
Western Boundary Streams
and
Related Data**

COLORADO RIVER

TIJUANA RIVER

SANTA CRUZ RIVER

SAN PEDRO RIVER

WHITEWATER DRAW

1990

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FOREWORD

This bulletin is the thirty-first annual compilation of stream discharges and other hydrographic data relating to international aspects of the Colorado River below Imperial Dam, the Tijuana River, and other streams crossing the western land boundary of the United States and Mexico. The compilation was prepared jointly by the United States and Mexican Sections of the International Boundary and Water Commission, solely for the purpose of presenting statistical data relating to stream flow and kindred subjects for the Colorado River from Imperial Dam to the Gulf of California, the Tijuana River and its important tributaries in the United States and Mexico, and other streams, including the Alamo and New Rivers which cross the California-Baja California boundary, and the Santa Cruz River and Whitewater Draw which cross the Arizona-Sonora boundary. This bulletin contains information for the year 1990.

Stream gaging on the Colorado River below Imperial Dam began in 1902 when the station at Yuma, Arizona was established. Stage records were obtained at this station from January 1878 until December 1973, when it was discontinued. Continuous stream gaging on the Tijuana River and its important tributaries in the United States and in Mexico began in 1936. Each government operates the gaging stations located within its own country.

COLORADO RIVER BELOW IMPERIAL DAM

Below Imperial Dam, the Colorado River flows southward 16 kilometres to the mouth of the Gila River, thence westward 18 kilometres to Pilot Knob Mountain, and south 1.6 kilometres to the point where the northerly international land boundary, between California and Baja California, intersects the river. From this point the river continues to flow southward and forms the boundary between the United States and Mexico for a distance of about 35 kilometres to the point where the southerly international land boundary between Arizona and Sonora intersects the river. From this point the river continues to flow southward about 145 kilometres to discharge into the Gulf of California.

The ordinary flows of Colorado River below Imperial Dam are largely controlled by releases at Hoover Dam, completed in 1935. The releases are further regulated at Davis Dam, completed in 1950, and by Parker and Imperial Dams, completed in 1938. Small amounts of runoff may occasionally be contributed to the flow in the lower river from the usually dry arroyos draining the 28,200 square kilometres along the river from Hoover Dam to the mouth of the Gila River. In addition, flows ranging from usually minor amounts to infrequent torrential floods may enter the lower Colorado River from the Bill Williams River, draining about 1,857 square kilometres below Alamo Dam and Lake, completed in 1963; and from the Gila River, draining about 18,900 square kilometres below Painted Rock Dam and Reservoir, completed in January 1960.

At Imperial Dam, diversions are made to Gila Gravity Main Canal and All-American Canal for irrigation projects in Arizona, including the Yuma Valley, Gila and Wellton-Mohawk projects; and in California, including the Imperial Valley, Coachella Valley and Reservation Division of Yuma Project. Also, under the provisions of the 1944 Water Treaty, there may be diverted to the All-American Canal at Imperial Dam for delivery to Mexico in the Alamo Canal, or substitute canal, at the northerly boundary, a portion of Mexico's scheduled deliveries of waters of the Colorado River, which in 1990 amounted to 1,850,234 thousand cubic metres, in accordance with Article 10 of the 1944 Water Treaty. No diversions were made to a substitute canal in 1990.

Below Laguna Dam, measured and unmeasured flows are returned to the river principally as waste and drainage water from the irrigation projects in the United States. Waste and drainage waters from irrigation projects in the United States also cross the boundary into Mexico near San Luis, Arizona without returning to the river in the United States.

In the limitrophe section of the river, 1.8 kilometres downstream from the northerly boundary, Morelos Dam, the principal diversion structure for Mexico, was completed and placed in operation on November 8, 1950. Since that date, almost all Colorado River waters diverted by Mexico (except emergency deliveries to Tijuana from August 1972 to August 1980) have been diverted to the Alamo Canal at Morelos Dam.

TIJUANA RIVER BASIN

The total drainage area of the Tijuana River basin is 4,483 square kilometres, of which 27 percent lies in the United States and 73 percent in Mexico. This river is formed by the principal tributaries, Cottonwood Creek, which rises in the United States and Rio de las Palmas, which rises in Mexico. Cottonwood Creek crosses the international land boundary 34 kilometres from the Pacific Ocean to join the Rio de las Palmas in Mexico. From the confluence of these tributaries, the Tijuana River flows northwesterly 8 kilometres to cross the land boundary into the United States near San Ysidro, California and Tijuana, Baja California, and then flows westerly 10 kilometres to discharge into the Pacific Ocean 3 kilometres north of the boundary. The flow of Cottonwood Creek is partially controlled by Barrett and Morena Reservoirs in the United States, and the flow of the Rio de las Palmas is partially controlled by Rodriguez Reservoir in Mexico.

WHITewater DRAW NEAR DOUGLAS, ARIZONA

Whitewater Draw rises in the United States and flows south into Mexico, crossing the international boundary near Douglas, Arizona, eventually discharging into the Gulf of California through the Yaqui River in Mexico. The total drainage area above the Douglas Gaging Station is 2,650 square kilometres. A number of mountain streams in the upper reaches of the basin are diverted for irrigation, but they would normally sink or go to ground water before reaching the main water course.

FOREWORD

SAN PEDRO RIVER AT PALOMINAS, ARIZONA

The San Pedro River rises in Mexico and flows north into the United States, crossing the boundary near Palominas, Arizona and thence northwesterly into the Gila River. The river in the vicinity of the international boundary drains an area of 1,919 square kilometres, of which 1,681 square kilometres are in Mexico.

SANTA CRUZ RIVER NEAR NOGALES AND LOCHIEL, ARIZONA

The Santa Cruz River rises in the United States and flows south into Mexico, crossing the international boundary near Lochiel, Arizona and returning to the United States near Nogales, Arizona, eventually discharging into the Gila River southwest of Phoenix, Arizona. The drainage area of the Santa Cruz River above Nogales station is 1,380 square kilometres. Of this amount, 901 square kilometres lie in Mexico. There are a few ground water irrigation diversions above the Lochiel station in Arizona and an unknown amount of water diverted for irrigation in Mexico.

ACKNOWLEDGMENTS

Other agencies which have contributed to the data published herein include the Bureau of Reclamation and the Geological Survey of the U. S. Department of the Interior; the National Weather Service, Department of Commerce; the Yuma County Water Users' Association; the Imperial Irrigation District; the city of San Diego, California; the Otay Municipal Water District; and the Ministry of Agriculture and Hydraulic Resources of Mexico. Specific notation is made of each of the above named agencies, where the data appear. The courtesy and cooperation of those who have made these contributions are acknowledged with appreciation.

UNITS OF MEASURE

This Bulletin is the first to be published in System International (SI) units which are based on the metric system. The following conversion constants may be used to convert to the English system of measurement. Data collected by the Mexican Section are computed and published in a Spanish version of the water bulletin in metric units.

METRIC TO ENGLISH CONVERSION CONSTANTS

METRIC UNITS			ENGLISH UNITS		
<u>LENGTH</u>					
1	Millimetre	x	0.03937	=	Inch
1	Metre	x	3.28084	=	Feet
1	Kilometre	x	0.62137	=	Mile
<u>AREA</u>					
1	Square Metre	x	10.76391	=	Square Feet
1	Hectare	x	2.47105	=	Acre
1	Square Kilometre	x	0.38610	=	Square Mile
<u>VOLUME</u>					
1	Cubic Metre	x	35.31467	=	Cubic Feet
1,000	Cubic Metres	x	0.81071	=	Acre-Feet
<u>WEIGHT</u>					
1	Kilogram	x	2.20462	=	Pounds
1	Megagram	x	1.10231	=	Tons (2,000 lbs.)
<u>TEMPERATURE</u>					
1	Degree Celsius	x	1.8 + 32	=	Degree Fahrenheit

GENERAL HYDROLOGIC CONDITIONS FOR 1990

COLORADO RIVER

Normally, there is no measurable amount of runoff from the portion of the Colorado River basin in the United States and Mexico below Hoover Dam, not including Bill Williams and Gila Rivers. There was no significant amount in 1990. In the lower basin of the Colorado River in Mexico, from Morelos Diversion Dam to the Gulf of California, the average precipitation during 1990 measured at 5 index stations was 13 millimetres compared to an average of 66 millimetres during the last 32 years (1959 to 1990).

The flow of the Colorado River reaching Imperial Dam was 7,448,124 thousands of cubic metres about 72% of the 56-year average (1935-1990) of 10,309,342 thousands of cubic metres. At the northerly international boundary, the total flow of the river during 1990 was 1,735,576 thousands of cubic metres, about 35% of the 1935-1990 average of 5,008,495 thousands of cubic metres. At the southerly international boundary, the flow during 1990 was 1,398 thousands of cubic metres, or less than 1% of the 1935-1990 average of 3,596,866 thousands of cubic metres.

The total of all flows of the Colorado River entering Mexico in 1990 amounted to 2,067,244 thousands of cubic metres, 37% of the 1935-1990 average of 5,641,238 thousands of cubic metres, as measured 1) in the Colorado River at the northerly international boundary, 2) in the Wellton-Mohawk Main Outlet Drain Extension near Morelos Dam, 3) in the wasteways that discharge into the limitrophe section of the river from the United States bank, 4) in the canal which discharges waste and drainage waters from the Yuma Project across the southerly land boundary into Mexico near San Luis, Arizona, 5) in the Wellton-Mohawk Bypass Drain at the southerly land boundary near San Luis, Arizona, and 6) from the 242 Well Field near San Luis, Arizona.

During 1990, other waters arrived at the Mexican points of diversion and amounted to 51,791 thousands of cubic metres. These waters consisted mainly of excess waters released from reservoirs on the Colorado River. A maximum instantaneous flow of 176 cubic metres per second occurred in the Colorado River at the northerly boundary station on August 15, 1990.

Stored waters at the end of the year in the three major reservoirs on the Colorado River below Lee's Ferry amounted to 27,138.4 millions of cubic metres, 77% of the usable capacity of 35,263.2 millions of cubic metres. The greater part (24,501.8 millions of cubic metres) of the storage was contained in Lake Mead (Hoover Dam). There were no reported shortages of Colorado River water for irrigation during 1990 due to drought or accident to the irrigation system.

The total reported area irrigated from waters of the Colorado River below Imperial Dam in 1990 was 476,531 hectares; 280,108 hectares in the United States and 196,423 hectares in Mexico. An estimated 33% of the total area irrigated in Mexico is served by pumping from ground water.

TIJUANA RIVER BASIN

During 1990, the temperatures at Barrett Dam, California (elevation 533.40 metres) in the upper portion of the basin in the United States averaged 16.7 degrees celsius, 0.3 degree above the 60-year mean. In the extreme upper portion of the basin in Mexico at El Pinal, Baja California (elevation 1349.96 metres), the recorded temperatures during the year averaged 15 degrees celsius, 2 degrees above the long-term average; and at Rodriguez Dam, Baja California (elevation 139.90 metres), the recorded temperatures averaged 18 degrees celsius, the same as the normal for many years.

At Barrett Dam in the upper portion of the basin in the United States, the recorded precipitation was 311 millimetres, 69% of normal; and at Chula Vista near the lower end of the basin, 173 millimetres, or 70% of normal. The recorded precipitation at El Pinal in the upper portion of the basin in Mexico was 420 millimetres, approximately 85% of the normal during the 27-year period; and at Rodriguez Dam in the lower portion of the basin in Mexico, 162 millimetres, 73% of the 53-year average.

Runoff above Barrett and Rodriguez Reservoirs during 1990 was about 2% of normal. Above Morena Reservoir, the runoff was 820 thousands of cubic metres, or about 6% of the 54-year 1937-1990 mean of 12,773 thousands of cubic metres. Above Barrett Reservoir, the runoff was 648 thousands of cubic metres, or about 4% of the 54-year 1937-1990 mean of 14,919 thousands of cubic metres. At Rodriguez Reservoir, the runoff was 371 thousands of cubic metres, or about 1% of the 53-year mean of 28,172 thousands of cubic metres.

The flow of the Tijuana River at the international boundary was 18,270 thousands of cubic metres during 1990.

WHITEWATER DRAW

During 1990, the average annual temperature over the watershed was 0.5 degree celsius above normal, while the annual precipitation was 122% of normal. Runoff for the year at the gaging station near Douglas, Arizona, of 1,170 thousands of cubic metres, was about 16% of average.

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GENERAL HYDROLOGIC CONDITIONS FOR 1990

SAN PEDRO RIVER

During 1990, the average annual temperature was 0.2 degree celsius below normal. The annual precipitation, as measured at Coronado National Monument Headquarters, was 98% of the 1961-1990 mean of 529 millimetres. The stream flow at the international boundary was 12,506 thousands of cubic metres, 45% of the 1951-1990 average.

SANTA CRUZ

During 1990, the average annual temperature over the watershed was 0.1 degree celsius above normal, and the annual precipitation was about 118% of the 52-year 1939-1990 mean. Runoff measured at the Nogales gaging station, where the stream re-enters the United States, was 20,422 thousands of cubic metres. The total runoff for the year measured at the gaging station near Lochiel, Arizona, where the stream enters Mexico from the United States, was 1,943 thousands of cubic metres. Therefore, neglecting stream flow depletions in Mexico, the records indicate a contribution of about 18,469 thousands of cubic metres from the loop of the river lying in Mexico, or approximately 90% of the flow reaching the Nogales station.

ALAMO AND NEW RIVERS

During 1990, the average annual temperature over the drainage areas of the Alamo and New Rivers, as recorded at El Centro, California, was 22.7 degrees celsius, 0.3 degree above normal; and over the drainage area of the New River as recorded at Mexicali, Baja California, it was 19 degrees celsius, 4 degrees below the 65-year average.

At El Centro, the precipitation was 50 millimetres, about 75% of the 60-year average; and in Mexicali, the annual precipitation was 54 millimetres, 69% of the 65-year average. The total flow of the New River at the international boundary in 1990 was 164,179 thousands of cubic metres, which was about 120% of the 1943-1990 average.

SALTON SEA

During 1990, the average annual temperature around the Salton Sea was 0.3 degree celsius below the long-term average, while the annual precipitation recorded at Brawley, California was approximately 107% of the long-term mean of 69 millimetres. The water surface of the Salton Sea remained about the same during the year. The maximum stage, 69.40 metres below mean sea level, was recorded on April 14-28 and May 4-10, 1990, inclusive. The minimum stage, 69.74 metres below mean sea level, was recorded on November 4 - December 7, 1990, inclusive.

09-5300.00 RESERVATION MAIN DRAIN NO. 4 (CALIFORNIA DRAIN)

DESCRIPTION: Water-stage recorder (digital) located 152 metres upstream from railroad culvert and 1.6 kilometres northwest of Yuma, Arizona. Discharge measurements are made from a footbridge immediately below the gage. The drainage canal discharges into the outfall channel of the Yuma Main Canal Wasteway 61.0 metres downstream from the spillway structure, and thence into the Colorado River on the right bank, 305 metres upstream from Colorado River below Yuma Main Canal Wasteway, and 10.5 kilometres upstream from the northerly international boundary. Prior to October 1955, published as "California Drainage Canal near Yuma, Arizona."

RECORDS: Based on current meter measurements and a continuous record of gage heights. Records are computed and furnished by the U. S. Geological Survey. Records available: Monthly discharge, January 1913 to April 1920, October 1921 to March 1925, and January 1934 to September 1947; daily and monthly discharge, October 1947 through 1990.

REMARKS: Reservation Main Drain No. 4 collects drainage and wastewater from the area east of the Yuma Main Canal on the Reservation Division of the Yuma Project, located in California. Since 1939, collection of seepage from the All-American Canal has caused large increases in drainage flows. Average annual flow prior to 1937 was 15,789,000 m³. Monthly and annual averages since 1937 are shown in the table below.

EXTREMES: Prior to 1937: Maximum annual flow 24,904,000 m³, 1916; minimum annual flow 11,003,000 m³, 1913.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.56	1.30	1.36	1.73	1.64	1.64	1.84	1.84	1.98	2.21	2.27	2.10
2	1.47	1.36	1.42	1.70	1.64	1.67	1.70	1.87	2.12	1.95	2.21	2.41
3	1.50	1.30	1.44	1.67	1.70	1.70	1.78	1.87	1.98	1.81	2.21	2.12
4	1.50	1.30	1.44	1.50	1.76	1.59	1.81	1.81	1.98	1.87	2.12	2.15
5	1.50	1.27	1.59	1.27	1.64	1.59	1.87	1.84	1.98	1.87	2.15	2.35
6	1.36	1.30	1.50	1.36	1.78	1.64	1.78	1.95	1.98	1.81	2.27	2.29
7	1.39	1.33	1.53	1.70	1.84	1.61	1.87	1.84	1.95	2.12	2.18	2.21
8	1.39	1.27	1.47	1.44	1.98	1.61	1.78	1.84	1.87	1.95	2.18	2.07
9	1.39	1.27	1.36	1.30	2.10	1.67	1.67	2.01	1.84	2.27	2.49	2.12
10	1.39	1.36	1.39	1.30	1.93	1.90	1.64	2.10	2.21	2.35	2.24	2.15
11	1.53	1.39	1.47	1.39	1.84	1.64	1.67	1.93	2.01	2.29	2.32	2.24
12	1.47	1.47	1.36	1.33	1.95	1.59	1.70	2.15	2.15	2.35	2.29	2.15
13	1.42	1.39	1.27	1.36	2.07	1.53	1.78	1.84	2.21	2.32	2.29	2.24
14	1.42	1.90	1.27	1.44	1.93	1.56	1.78	2.41	2.01	2.07	2.18	2.21
15	1.36	1.39	1.42	1.64	2.10	1.59	2.12	6.03	2.01	2.10	2.24	2.10
16	1.59	1.50	1.50	1.90	1.93	1.67	1.93	2.95	2.12	2.01	2.27	1.98
17	1.59	1.53	1.44	1.67	1.93	1.73	1.78	1.87	2.21	2.12	2.18	2.15
18	1.36	1.47	1.87	1.59	1.93	1.81	1.73	1.87	2.04	2.24	2.35	2.12
19	1.33	1.56	1.87	1.44	2.21	1.59	1.78	1.87	2.01	2.24	2.15	2.18
20	1.30	1.59	1.61	1.53	2.07	1.56	1.93	1.87	1.93	2.24	2.27	1.95
21	1.44	1.50	1.53	1.47	2.29	1.61	1.78	1.90	2.07	2.38	2.21	2.24
22	1.30	1.39	1.44	1.47	2.35	1.56	1.84	2.18	2.04	2.46	1.98	1.78
23	1.44	1.39	1.25	1.47	2.27	1.59	1.76	1.84	2.10	2.58	2.35	2.10
24	1.36	1.44	1.25	1.47	2.07	1.64	1.78	1.78	1.93	2.24	2.07	2.35
25	1.36	1.56	1.39	1.53	2.07	1.61	1.81	1.81	1.95	2.15	2.10	2.10
26	1.33	1.59	1.30	1.59	2.07	1.61	1.81	1.93	2.04	2.27	2.07	2.21
27	1.30	1.42	1.27	1.61	1.59	1.59	1.78	1.93	2.12	2.29	2.07	2.10
28	1.27	1.36	1.27	1.61	1.73	1.70	1.81	1.76	2.10	2.35	1.90	2.10
29	1.33		1.30	1.67	1.67	1.61	1.76	1.81	1.93	2.27	1.95	1.90
30	1.30		1.56	1.61	1.56	1.70	1.76	1.90	1.90	2.32	1.95	1.67
31	1.30		1.33		1.61		1.78	1.98		2.21		1.93
Sum	43.55	39.90	44.47	45.76	59.25	49.11	55.61	64.58	60.77	67.71	65.51	65.77
Current Year 1990										Period 1937-1990		
Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres				
	High	Low	Day	φ High		φ Low		Total	Average	Maximum	Minimum	
				Day								Day
Jan.			116	1.59	28	1.27	1.40	3,763	3,972	5,896	1,082	
Feb.			14	1.90	5	1.27	1.43	3,447	3,730	5,493	694	
Mar.			118	1.87	123	1.25	1.43	3,842	4,597	6,476	1,530	
April			16	1.90	5	1.27	1.53	3,954	4,602	6,476	1,431	
May			22	2.35	30	1.56	1.91	5,119	4,725	6,895	1,224	
June			10	1.90	13	1.53	1.64	4,243	4,555	6,883	1,092	
July			15	2.12	10	1.64	1.79	4,805	4,882	8,079	1,007	
Aug.			15	6.03	28	1.76	2.08	5,580	4,910	8,400	1,062	
Sept.			110	2.21	9	1.84	2.03	5,251	4,630	7,672	1,097	
Oct.			23	2.58	1	1.81	2.18	5,850	4,762	7,080	1,283	
Nov.			9	2.49	28	1.90	2.18	5,660	4,441	6,772	1,226	
Dec.			2	2.41	30	1.67	2.12	5,683	4,261	6,118	1,192	
Yearly				6.03		1.25	1.81	57,197	54,067	78,573	15,838	

♦ Mean daily

! And other days

WESTERN BOUNDARY WATER BULLETIN - 1990 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

09-5250.00 YUMA MAIN CANAL WASTEWAY TO COLORADO RIVER AT YUMA, ARIZONA

DESCRIPTION: The wasteway receives water from the Yuma Main Canal at the check structure on the canal, 501 metres upstream from the intake of the Colorado River siphon, and 5.1 kilometres downstream from the Siphon Drop Power Plant. This wasteway discharges into the Colorado River on the California side, 305 metres upstream from Colorado River below Yuma Main Canal Wasteway, and 10.5 kilometres upstream from the northerly international land boundary.

RECORDS: Discharge is computed as the difference between the measured discharge of the Yuma Main Canal at the Siphon Drop Power Plant upstream and that of the same canal below the Colorado River siphon, with deductions for small irrigation diversions from the canal between the two gaging stations. Records obtained and furnished by U. S. Geological Survey. Records available: April 1913 through 1990.

REMARKS: The wasteway discharges to the river the flow in excess of irrigation water in the Yuma Main Canal.

EXTREMES: Prior to 1935, when storage began in Lake Mead: Average annual flow, 367,333,000 m³; maximum annual flow, 1,127,040,000 m³, 1932; minimum annual flow, 141,728,000 m³, 1917. Since 1935: Maximum mean daily discharge, 57.2 m³/sec, December 24-25, 1948; minimum mean daily discharge, no flow on numerous occasions.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	21.5	2.32	13.3	22.5	7.16	15.2	19.3	0.17	24.4	13.2	11.3	13.8
2	24.2	1.87	12.9	23.3	5.92	16.8	16.0	4.11	20.6	12.4	11.8	12.8
3	24.4	1.61	11.1	22.8	3.79	18.9	11.6	4.11	19.8	8.92	11.6	16.6
4	24.3	4.13	13.0	20.4	1.16	15.0	10.7	1.02	21.8	9.83	12.2	18.4
5	22.3	4.47	17.1	5.13	1.08	11.2	12.2	7.02	34.0	13.5	12.7	19.8
6	22.3	5.07	17.8	1.95	6.00	9.94	13.1	8.67	28.1	13.0	12.5	20.1
7	22.7	5.01	17.9	4.45	20.5	11.2	14.5	7.19	20.0	12.7	14.2	19.7
8	23.7	4.39	8.50	10.4	23.2	11.0	18.3	7.62	21.5	13.3	10.7	19.3
9	23.7	2.78	8.69	10.7	23.1	10.3	13.9	9.77	21.4	13.2	11.9	21.4
10	23.9	5.24	12.5	9.94	19.2	11.0	11.9	13.7	17.0	11.9	12.2	22.8
11	25.9	10.7	16.7	6.57	17.0	16.0	12.4	12.1	14.4	11.6	12.3	23.3
12	25.7	13.0	15.4	3.74	16.1	13.5	14.0	6.97	19.0	12.3	12.6	23.1
13	25.0	10.4	12.0	4.62	15.3	11.0	15.0	5.86	20.8	12.2	12.8	22.8
14	24.0	15.3	10.6	8.30	18.5	11.6	17.2	16.1	14.7	12.6	12.0	22.7
15	24.3	12.0	8.50	18.6	21.0	15.3	19.5	16.9	21.5	12.6	12.3	24.4
16	26.0	12.9	7.48	20.6	21.1	15.9	18.3	21.0	22.8	12.4	11.9	22.7
17	26.7	13.5	13.6	17.1	21.7	17.0	15.7	39.4	21.8	11.3	13.0	24.6
18	24.1	14.8	22.2	14.8	22.3	17.6	15.4	45.6	23.0	11.9	10.1	23.7
19	21.6	19.1	23.5	5.66	23.0	14.3	13.3	34.8	21.9	11.5	12.9	23.6
20	21.4	17.1	21.0	2.38	21.8	12.1	13.2	27.0	21.4	11.6	12.8	23.4
21	12.2	15.7	18.5	3.65	26.3	12.4	13.8	11.8	20.5	13.0	13.2	20.7
22	5.81	14.6	8.55	6.68	27.1	12.2	17.3	11.0	20.4	11.7	13.5	4.62
23	4.28	16.0	8.98	8.69	26.5	13.4	14.4	11.4	19.9	12.7	13.8	22.3
24	1.78	17.1	8.33	9.94	22.9	18.7	8.89	13.1	20.8	13.3	12.2	25.5
25	2.69	18.6	10.5	10.0	23.5	17.2	6.49	15.0	20.7	11.8	8.33	25.3
26	2.15	16.3	8.75	6.43	21.1	13.5	6.00	15.2	21.2	10.4	16.0	23.8
27	2.38	11.9	9.06	4.28	2.78	9.49	5.30	16.6	21.8	11.6	13.1	18.3
28	6.17	13.5	7.39	4.08	10.2	6.40	3.91	11.9	18.9	11.9	7.53	22.5
29	5.64		5.89	11.4	9.91	7.82	.17	11.4	18.7	12.3	8.92	20.4
30	4.98		6.74	11.5	11.8	13.8	.17	15.5	16.4	11.9	11.8	9.26
31	4.19		8.18		12.9		.17	28.0		11.4		18.3
Sum	529.97	299.39	384.64	310.59	503.90	399.75	372.10	450.01	629.2	373.95	362.18	629.98

Current Year 1990

Period 1935-1990

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.			17	26.7	24	1.78	17.1	45,789	55,879	136,546	550
Feb.			19	19.1	3	1.61	10.7	25,867	4,873	109,953	444
Mar.			19	23.5	29	5.89	12.4	33,233	48,259	111,248	440
April			2	23.3	6	1.95	10.4	26,835	48,431	106,795	402
May			22	27.1	5	1.08	16.3	43,537	57,908	108,892	411
June			3	18.9	28	6.40	13.3	34,538	50,690	107,263	422
July			15	19.5	29	.17	12.0	32,149	47,603	112,518	455
Aug.			18	45.6	1	.17	14.5	38,881	48,376	110,878	455
Sept.			5	34.0	11	14.4	21.0	54,363	53,243	103,193	440
Oct.			5	13.5	3	8.92	12.1	32,309	49,329	111,075	699
Nov.			16	16.0	28	7.53	12.1	31,292	49,042	125,198	882
Dec.			24	25.5	22	4.62	20.3	54,430	55,289	134,203	570
Yearly				45.6		0.17	14.4	453,223	612,792	1,286,335	8,226

♦ Mean daily

09-5211.00 COLORADO RIVER BELOW YUMA MAIN CANAL WASTEWAY
AT YUMA, ARIZONA - DISCHARGES

DESCRIPTION: Water-stage recorder located in California on the right bank of the river, 305 metres downstream from the mouth of the Yuma Main Canal Wasteway, 1.0 kilometres downstream from the abandoned gaging station on the Colorado River at Yuma, 8.4 kilometres downstream from the mouth of the Gila River, 31.5 kilometres downstream from Imperial Dam, and 10.3 kilometres upstream from the northerly international boundary. Zero of the gage is 31.09 metres above mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on current meter measurements and a continuous record of gage heights. Computations by shifting control methods. Records obtained and furnished by U. S. Geological Survey. Records available: October 1963 through 1990. Records from January 1951 through September 1963 deduced from "Colorado River at Yuma" plus flows from "Reservation Main Drain No. 4" and "Yuma Main Canal Wasteway."

REMARKS: Reservoirs on the Colorado River, power developments, transmountain diversions, reservoirs on the Gila River, irrigation diversions, and return flows modify the river flow at this station.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND												
Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	37.1	18.7	27.7	37.1	23.5	30.9	32.9	16.3	38.2	29.2	26.2	31.2
2	36.0	18.2	29.2	37.7	21.6	33.4	30.0	17.2	34.6	28.3	26.1	30.6
3	37.7	17.0	30.9	36.8	20.3	34.8	26.1	22.0	34.3	25.1	26.3	33.1
4	37.9	19.8	32.0	34.6	16.9	30.3	25.2	18.5	72.2	24.9	26.3	35.1
5	37.4	18.5	36.5	21.9	14.4	27.1	26.3	20.4	63.4	28.6	27.2	34.8
6	36.8	17.6	35.4	18.5	18.1	25.8	28.6	22.0	41.1	27.5	26.5	35.1
7	36.8	17.6	35.4	20.8	36.5	26.6	30.3	20.6	31.4	27.0	27.6	35.1
8	36.5	17.0	26.5	25.7	37.1	26.9	33.7	20.3	31.4	27.0	28.2	34.8
9	36.2	16.6	23.3	26.4	36.5	25.9	27.7	22.0	32.9	28.0	27.7	35.4
10	35.7	18.8	26.9	25.9	34.0	26.6	25.5	25.9	48.7	27.0	27.4	35.7
11	36.0	26.1	34.0	22.8	32.9	31.4	25.7	24.5	38.8	26.6	27.6	36.0
12	35.7	27.9	33.4	20.5	32.6	29.5	27.8	27.9	38.5	27.4	27.8	35.4
13	35.4	25.1	29.7	21.6	33.1	26.5	29.5	32.0	39.4	27.1	28.1	35.1
14	35.4	44.7	28.6	30.3	35.4	26.8	30.6	40.8	36.8	27.4	28.0	35.4
15	34.8	29.2	26.7	36.2	37.4	31.2	32.9	53.0	37.1	27.1	27.8	35.7
16	35.4	28.0	25.6	42.5	36.2	32.3	32.0	39.9	37.7	27.3	27.1	35.4
17	36.0	28.6	30.0	35.4	36.8	32.9	30.3	53.0	37.4	26.2	27.6	36.8
18	34.3	28.9	38.5	30.0	36.2	33.4	29.5	71.4	37.9	27.2	28.6	36.2
19	34.0	33.7	39.4	21.8	36.5	29.5	27.6	50.7	37.7	26.3	27.2	36.0
20	34.3	32.0	36.5	19.5	36.2	26.5	29.2	41.3	36.2	25.8	27.1	36.5
21	25.2	30.6	34.0	20.2	39.6	26.8	30.6	24.0	35.1	26.5	28.1	35.7
22	17.1	29.5	25.5	22.4	40.5	26.8	33.1	22.7	36.0	25.7	28.6	34.3
23	17.8	30.3	26.3	24.1	40.8	27.4	30.0	24.0	35.1	26.1	28.6	35.7
24	16.9	32.0	27.4	25.9	40.5	32.9	25.3	25.2	36.2	26.7	29.5	37.7
25	17.4	34.0	32.3	24.6	40.2	31.7	22.4	27.7	36.2	25.8	27.5	38.2
26	16.3	31.7	29.5	21.6	39.4	28.0	20.4	28.2	36.5	25.8	29.2	39.9
27	15.3	27.9	29.2	20.1	20.2	23.4	19.7	34.8	36.8	25.8	28.9	38.8
28	23.6	28.6	28.0	20.2	26.9	21.2	20.5	28.3	35.4	26.3	30.3	37.4
29	20.8		24.9	31.2	25.6	21.7	19.7	29.5	35.1	26.2	30.3	36.2
30	19.5		25.2	29.7	26.6	27.0	18.6	30.0	32.6	25.9	30.9	37.9
31	19.1		24.4		28.3		16.0	42.8		26.5		38.2
Sum	928.4	728.6	932.9	806.0	980.8	855.2	837.7	956.9	1,160.7	828.3	838.3	1,109.4
Current Year 1990									Period 1951-1990			
Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres				
	High	Low	Day	High		Low		Total	Average	Maximum	Minimum	
				Day	Day	Day						Day
Jan.	2.92	2.42	1	40.8	27	12.9	29.9	80,214	300,546	1,317,479	36,26	
Feb.	3.08	2.45	14	51.5	8	15.1	26.0	62,951	227,525	1,228,424	41,79	
Mar.	2.90	2.59	118	40.2	9	21.7	30.1	80,603	231,350	1,323,857	42,83	
April	2.99	2.50	16	46.2	6	17.6	26.9	69,638	215,065	1,039,836	41,52	
May	2.93	2.40	23	43.0	5	13.5	31.6	84,741	227,434	1,065,554	56,82	
June							28.5	73,889	231,463	1,113,679	41,61	
July							27.0	72,377	268,906	2,013,773	42,48	
Aug.	3.45	2.43	18	79.6	2	15.2	30.9	82,676	274,928	2,073,958	41,57	
Sept.	3.78	2.66	4	102	23	27.0	38.7	100,284	243,000	1,669,785	53,64	
Oct.	2.83	2.50	14	37.4	4	18.5	26.7	71,565	207,973	1,789,911	43,29	
Nov.	2.82	2.58	29	36.0	15	21.5	27.9	72,429	210,575	1,292,035	42,65	
Dec.	2.92	2.69	6	43.3	2	28.6	35.8	95,852	246,947	1,374,775	40,33	
Yearly							30.0	947,219	2,885,712	13,065,596	633,07	

! And other days

09-5211.01 COLORADO RIVER BELOW YUMA MAIN CANAL WASTEWAY
AT YUMA, ARIZONA - STAGES

(See Preceding Page for Description)

MEAN DAILY GAGE HEIGHT IN METRES 1990

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.86	2.55	2.69	2.87	2.62	2.73		2.45	2.89	2.70	2.68	2.74
2	2.84	2.53	2.71	2.88	2.59	2.77		2.47	2.83	2.69	2.67	2.73
3	2.87	2.51	2.73	2.86	2.56	2.80		2.57	2.82	2.63	2.68	2.77
4	2.88	2.57	2.75	2.82	2.47	2.73		2.51	3.40	2.62	2.67	2.80
5	2.87	2.54	2.82	2.60	2.42	2.67		2.56	3.32	2.69	2.69	2.80
6	2.87	2.51	2.80	2.53	2.49	2.65		2.60	2.99	2.68	2.68	2.80
7	2.87	2.51	2.81	2.58	2.83	2.67		2.57	2.82	2.67	2.69	2.80
8	2.86	2.50	2.66	2.68	2.84	2.67		2.57	2.80	2.67	2.70	2.80
9	2.86	2.49	2.61	2.69	2.83	2.65		2.61	2.80	2.69	2.69	2.81
10	2.85	2.54	2.67	2.68	2.79	2.66		2.68	3.03	2.67	2.69	2.81
11	2.86	2.69	2.79	2.62	2.77	2.74		2.66	2.85	2.67	2.69	2.82
12	2.86	2.71	2.78	2.57	2.77	2.71		2.71	2.84	2.68	2.69	2.81
13	2.86	2.67	2.72	2.60	2.77	2.66		2.78	2.86	2.67	2.70	2.81
14	2.86	2.98	2.71	2.74	2.82	2.67		2.93	2.81	2.68	2.70	2.81
15	2.85	2.73	2.68	2.83	2.85	2.74		3.11	2.82	2.68	2.69	2.81
16	2.86	2.71	2.66	2.93	2.83	2.75		2.91	2.83	2.68	2.68	2.80
17	2.87	2.71	2.73	2.82	2.83	2.77		3.11	2.83	2.66	2.69	2.83
18	2.85	2.72	2.87	2.73	2.83	2.78		3.35	2.83	2.68	2.70	2.82
19	2.84	2.80	2.89	2.58	2.83	2.71		3.07	2.83	2.67	2.68	2.81
20	2.85	2.77	2.84	2.54	2.82	2.66		2.93	2.80	2.66	2.68	2.82
21	2.69	2.74	2.80	2.55	2.88	2.67		2.65	2.79	2.67	2.69	2.80
22	2.53	2.72	2.67	2.60	2.89	2.67		2.64	2.80	2.66	2.70	2.77
23	2.55	2.74	2.68	2.63	2.90	2.68		2.66	2.79	2.67	2.70	2.79
24	2.52	2.76	2.70	2.66	2.89	2.76		2.68	2.81	2.68	2.72	2.83
25	2.54	2.79	2.78	2.64	2.89	2.75		2.72	2.81	2.66	2.68	2.83
26	2.51	2.75	2.74	2.58	2.87	2.69		2.72	2.81	2.66	2.71	2.86
27	2.48	2.69	2.73	2.55	2.54			2.83	2.82	2.67	2.70	2.84
28	2.66	2.70	2.72	2.55	2.67		2.55	2.72	2.80	2.67	2.72	2.81
29	2.61		2.67	2.74	2.65		2.53	2.75	2.79	2.67	2.72	2.79
30	2.58		2.67	2.72	2.66		2.51	2.75	2.75	2.67	2.73	2.82
31	2.56		2.66		2.69		2.44	2.96		2.68		2.82
Avg.	2.76	2.67	2.73	2.68	2.74			2.75	2.87	2.67	2.69	2.81

09-5302.00 YUMA MESA OUTLET DRAIN
TO COLORADO RIVER NEAR YUMA, ARIZONA

DESCRIPTION: Venturi meter with recorder 0.5 kilometre from outlet to Colorado River, 0.8 kilometre west of Joe Henry Memorial Park in Yuma, Arizona. Outlet is 2.7 kilometres downstream from the mouth of Yuma Main Canal Wasteway.

RECORDS: Records are furnished by U. S. Geological Survey. Records available: July 1970 through 1990. Prior to July 21, 1972, records furnished by U. S. Bureau of Reclamation.

REMARKS: Records show water pumped from wells on the Yuma Mesa and conveyed by underground conduit to Colorado River.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.47	1.02	1.36	1.13	0.82	0.82	1.13	0.79	0.74	0.37	0.71	0.71
2	.79	1.02	1.36	1.13	.82	.82	1.13	.76	.82	.25	.71	.71
3	0	1.02	1.36	1.13	.82	.82	1.13	.76	.82	.45	.71	.71
4	0	1.02	1.36	1.13	.82	.82	1.13	.76	.31	.37	.71	.62
5	.45	1.02	1.36	1.13	.82	.82	1.13	.76	0	.48	.71	.65
6	.71	1.02	1.36	1.13	.82	.82	.37	.76	.03	.59	.71	.74
7	.71	1.02	1.36	1.13	.82	.82	0	.76	.62	.59	.71	.74
8	.71	1.02	1.36	1.13	.82	.82	0	.76	.82	.59	.71	.74
9	.71	1.02	1.36	1.13	.82	.82	0	.76	.82	.59	.71	.74
10	.71	1.02	1.36	1.13	.82	.82	0	.76	.82	.59	.71	.74
11	.71	1.02	1.36	1.13	.82	.74	0	.76	.82	.59	.71	.79
12	.71	1.27	1.36	1.13	.82	.65	0	.31	.82	.59	.71	.93
13	.79	1.39	1.36	1.13	.82	.74	0	0	.82	.59	.71	.96
14	.82	1.39	1.36	1.13	.82	.91	0	0	.82	.59	.71	.96
15	.82	1.39	1.36	1.13	.37	1.13	0	0	.82	.59	.45	.96
16	.82	1.39	1.36	.96	0	1.13	0	0	.82	.59	.59	.96
17	.96	1.39	1.36	.74	0	1.02	0	0	.79	.59	.71	.96
18	1.10	1.39	1.36	.82	0	1.08	0	0	.71	.59	.71	.96
19	1.10	1.39	1.36	.82	0	1.13	0	0	.71	.59	.71	.96
20	1.10	1.39	1.36	.82	0	1.13	0	.48	.71	.48	.71	.96
21	1.10	1.39	1.36	.82	0	1.13	0	.74	.71	.59	.71	.96
22	1.10	1.39	1.36	.82	0	1.13	0	.54	.71	.59	.71	.96
23	1.10	1.39	1.36	.82	.40	1.13	.28	.54	.65	.65	.71	.96
24	1.10	1.39	1.36	.82	.82	1.13	.79	.74	.48	.71	.71	.96
25	1.10	1.39	1.36	.82	.82	1.05	.82	.74	.54	.71	.42	.96
26	1.10	1.39	1.36	.82	.82	.99	.82	.74	.59	.71	.40	.96
27	1.10	1.39	1.36	.82	.82	1.08	.82	.74	.59	.71	.68	.96
28	1.10	1.39	1.22	.82	.82	1.13	.82	.74	.59	.71	.71	.96
29	1.10		1.16	.82	.82	1.13	.82	.74	.59	.71	.71	.96
30	1.10		1.16	.82	.82	1.13	.82	.74	.59	.71	.71	.96
31	1.10		1.16		.82		.82	.74		.71		.96
Sum	27.29	34.73	41.42	29.31	18.81	28.89	12.83	16.92	19.68	18.17	20.29	27.06
Current Year 1990										Period 1971-1990		
Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres				
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum	
Jan.			1	1.47	13	0	0.88	2,358	2,882	7,204	0	
Feb.			113	1.39	11	1.02	1.24	3,001	2,805	5,958	0	
Mar.			11	1.36	129	1.16	1.34	3,579	3,253	6,698	4.9	
April			11	1.13	17	.74	.98	2,532	3,095	6,315	299	
May			11	.82	116	0	.61	1,625	3,024	6,085	0	
June			119	1.13	12	.65	.96	2,496	2,703	5,955	0	
July			11	1.13	17	0	.41	1,109	3,014	6,796	854	
Aug.			11	.79	113	0	.55	1,462	3,195	7,401	222	
Sept.			12	.82	5	0	.66	1,700	3,252	7,253	0	
Oct.			124	.71	2	.25	.59	1,570	3,148	6,611	194	
Nov.			11	.71	26	.40	.68	1,753	3,198	6,525	386	
Dec.			113	.96	4	.62	.87	2,338	3,482	7,364	0	
Yearly				1.47		0	0.81	25,523	37,051	72,381	2,162	

♦ Mean daily

! And other days

WESTERN BOUNDARY WATER BULLETIN - 1990 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

09-5305.00 DRAIN NO. 8-B (ARAZ DRAIN)

DESCRIPTION: This drain discharges into the Colorado River 6.4 kilometres downstream from Colorado River below Yuma Main Canal Wasteway, and 4.0 kilometres upstream from the northerly international boundary. Prior to October 1955, published as "Araz Drain."

RECORDS: Records are furnished by the U. S. Geological Survey from current meter measurements during the year. Records available: May 1948 through 1990.

REMARKS: Drain 8-B, which was constructed in February 1948, collects seepage water in the westerly section of the Reservation Division of the Yuma Project which lies in California. Flow in the drain between the mouth and the U. S. Highway No. 80 culvert, about 975 metres upstream, is affected by backwater from the river during ordinary high stages.

EXTREMES: Mean daily discharge: Maximum, 0.74 m³/sec on October 30, 1990; minimum no flow several days in February 1966.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.14	0.20	0.27	0.12	0.14	0.18	0.17	0.17	0.17	0.34	0.45	0.40
2	.13	.19	.28	.12	.14	.18	.17	.17	.16	.31	.34	.37
3	.13	.17	.25	.11	.14	.17	.16	.17	.16	.27	.34	.31
4	.14	.16	.20	.11	.13	.17	.17	.17	.15	.24	.31	.25
5	.14	.15	.16	.12	.13	.17	.17	.17	.16	.24	.31	.25
6	.15	.14	.11	.12	.13	.16	.17	.17	.18	.24	.31	.25
7	.16	.14	.12	.12	.13	.16	.17	.18	.18	.24	.31	.25
8	.16	.13	.12	.12	.12	.16	.17	.18	.18	.24	.28	.25
9	.17	.13	.12	.12	.12	.16	.17	.18	.18	.24	.28	.25
10	.17	.13	.13	.12	.12	.15	.17	.18	.18	.24	.28	.25
11	.18	.13	.13	.12	.12	.15	.17	.18	.18	.24	.27	.25
12	.18	.12	.14	.12	.12	.15	.17	.18	.18	.24	.27	.24
13	.18	.12	.14	.12	.13	.14	.17	.18	.18	.25	.26	.24
14	.18	.12	.14	.12	.13	.14	.17	.18	.19	.25	.25	.24
15	.19	.12	.14	.12	.13	.14	.18	.18	.19	.25	.26	.23
16	.19	.12	.15	.12	.14	.14	.18	.18	.19	.25	.28	.23
17	.19	.12	.15	.12	.14	.15	.18	.18	.19	.25	.28	.22
18	.19	.12	.16	.12	.14	.15	.18	.18	.19	.25	.31	.22
19	.20	.12	.16	.12	.14	.15	.17	.18	.20	.25	.31	.21
20	.20	.11	.16	.13	.15	.16	.16	.18	.20	.25	.34	.21
21	.20	.11	.17	.13	.15	.16	.16	.17	.20	.25	.34	.20
22	.20	.13	.17	.13	.15	.16	.15	.17	.20	.25	.37	.20
23	.21	.15	.16	.13	.15	.17	.15	.17	.20	.25	.37	.20
24	.21	.17	.16	.14	.16	.17	.14	.17	.20	.25	.40	.19
25	.21	.19	.16	.14	.16	.18	.14	.17	.20	.25	.40	.19
26	.22	.21	.15	.14	.16	.18	.14	.17	.20	.25	.40	.18
27	.22	.23	.14	.14	.16	.18	.15	.17	.21	.25	.42	.18
28	.22	.25	.14	.14	.17	.18	.15	.17	.24	.25	.42	.17
29	.22	.14	.14	.14	.17	.18	.16	.17	.27	.25	.45	.20
30	.23	.13	.14	.17	.17	.16	.16	.17	.31	.74	.45	.22
31	.21	.12	.12	.18	.18	.17	.17	.17	.17	.59	.24	.24
Sum	5.72	4.18	4.87	3.76	4.42	4.86	5.09	5.41	5.82	8.66	10.06	7.29

Current Year 1990

Period 1948-1990

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second					Average	Volume-Thousands of Cubic Metres			
	High	Low	Day	φ High	φ Low		Total		Average	Maximum	Minimum	
					Day	φ						
Jan.			30	0.23	1	2	0.13	0.18	494	435	1,109	48.5
Feb.			28	.25	120		.11	.15	361	374	920	50.0
Mar.			2	.28	6		.11	.16	421	437	1,052	77.3
April			124	.14	1	3	.11	.13	325	447	1,233	82.4
May			31	.18	1	8	.12	.14	382	464	1,192	71.9
June			1	.18	113		.14	.16	420	484	1,270	83.1
July			15	.18	124		.14	.16	440	555	1,554	89.8
Aug.			1	.18	1		.17	.17	467	615	1,665	91.0
Sept.			30	.31	4		.15	.19	503	604	1,690	66.1
Oct.			30	.74	1	4	.24	.28	748	637	1,505	68.2
Nov.			1	.45	14		.25	.34	869	576	1,530	71.2
Dec.			1	.40	28		.17	.24	630	505	1,295	52.1
Yearly				0.74			0.11	0.19	6,060	6,133	15,331	955

φ Mean daily

! And other days

09-5270.00 PILOT KNOB POWER PLANT AND WASTEWAY
NEAR PILOT KNOB, CALIFORNIA

DESCRIPTION: The Pilot Knob Power Plant and Wasteway is located on the All-American Canal, 33.5 kilometres downstream from the intake at Imperial Dam, 9.7 kilometres west of Yuma, about 1.6 kilometres north of the northerly international boundary and empties into the old Alamo Canal in the United States and thence into the Colorado River through Rockwood gates, about 1.6 kilometres upstream from the northerly international boundary. Water-stage recorder is located in forebay on right bank of the All-American Canal, 168 metres upstream from wasteway gates and 549 metres from the entrance to the power plant. Datum of gage is 45.72 metres above mean sea level. Tailrace gage is on left bank, 207 metres downstream from power plant with automatic recording equipment in control house. All bypass gates are equipped with calibrated openings which are read on all gate changes. Datum of tailrace gage is at mean sea level; elevation of sill of wasteway gates is 45.07 metres, U. S. C. & G. S. datum. Prior to October 1956, this station was published as "Pilot Knob Wasteway near Pilot Knob, California."

RECORDS: Daily discharge is computed from flowmeter equipment and head and openings on wasteway gates or from head and gate opening on wicket and wasteway gates. Records furnished by the U. S. Geological Survey. Records available: July 1944 through 1990. The wasteway was operated for the purpose of diverting Colorado River water to the Alamo Canal for use in Mexico from July 1944 to November 8, 1950 in accordance with arrangements between the United States and Mexico for emergency use of the All-American Canal facilities. Records since 1950 show water released through Pilot Knob Power Plant and Wasteway from the All-American Canal and returned to the Colorado River through Rockwood gates.

REMARKS: Pilot Knob Wasteway was completed in 1938, and the first flow occurred on February 5, 1939. Pilot Knob Power Plant was completed in January 1957, and the first flow occurred on January 14, 1957.

EXTREMES: Maximum mean daily discharge, 281 m³/sec on October 6, 1985; minimum daily discharge, no flow during long periods.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	28.3	32.0	40.8	43.0	29.2	37.4	50.7	0	0	0	0
2	0	28.3	30.9	37.9	37.4	31.2	35.4	46.2	0	0	0	0
3	0	28.3	28.6	39.1	29.5	35.1	40.5	33.1	0	15.1	0	0
4	0	28.3	28.6	40.8	28.6	28.3	39.9	38.2	8.24	27.4	0	0
5	0	28.3	30.6	53.8	28.9	28.1	39.1	37.4	29.2	0	0	0
6	0	28.3	31.2	59.5	28.3	28.1	39.9	31.4	18.3	0	0	0
7	0	28.3	30.9	58.3	0	28.1	40.8	32.9	0	0	0	0
8	0	28.3	42.2	52.1	0	28.1	35.1	34.3	0	0	0	0
9	0	28.3	45.9	54.9	0	28.1	40.5	32.3	0	0	0	0
10	0	28.3	43.3	54.7	0	28.1	40.2	28.6	0	0	0	0
11	0	28.3	39.6	56.1	0	28.6	41.6	28.6	8.72	0	0	0
12	0	28.3	39.4	60.3	0	30.6	39.1	28.6	28.6	0	0	0
13	0	28.3	43.6	58.3	0	35.7	40.8	29.2	4.16	0	0	0
14	0	28.2	47.9	50.1	0	36.8	39.1	54.7	0	0	0	0
15	0	28.3	48.1	45.0	0	30.6	37.4	98.0	0	0	0	0
16	0	28.3	50.4	38.8	0	28.9	35.7	62.6	0	0	0	0
17	0	28.3	47.3	43.3	0	28.6	42.2	31.7	0	0	0	0
18	0	28.3	41.1	50.7	0	36.0	41.6	44.7	0	0	0	0
19	0	28.3	39.1	58.9	0	41.6	42.5	29.7	0	0	0	0
20	0	30.6	41.6	60.9	0	45.0	39.4	28.6	0	0	0	0
21	16.2	32.6	42.2	59.5	0	48.1	37.9	30.9	0	0	0	0
22	26.8	37.9	50.7	57.8	0	47.9	35.1	31.2	.28	0	0	0
23	27.1	37.4	50.4	55.5	0	46.7	40.8	32.3	0	0	0	0
24	28.3	36.2	50.1	52.1	0	42.5	43.3	30.9	0	0	0	0
25	28.3	31.7	46.4	50.7	0	45.9	47.3	28.6	0	0	0	0
26	28.3	36.0	49.0	53.8	0	50.7	51.5	28.6	0	0	0	0
27	28.3	42.5	49.0	54.4	28.3	54.1	54.9	28.6	0	0	0	0
28	28.3	39.6	50.1	55.2	28.3	57.5	52.7	29.7	0	0	0	0
29	28.3		53.5	42.8	28.3	56.9	51.8	30.3	0	0	0	0
30	28.3		52.4	44.7	28.3	52.7	55.8	29.5	0	0	0	0
31	28.6		54.1		30.6		61.2	0	0	0	0	0
Sum	296.8	862.1	1,330.2	1,540.8	340.1	1,137.8	1,320.5	1,102.1	97.50	42.5	0	0

Current Year 1990

Period 1944-1990

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres				
	High	Low	Day	φ High		Day		φ Low	Total	Average	Maximum	Minimum
Jan.			31	28.6	1	1	0	9.57	25,644	110,105	643,620	0
Feb.			27	42.5	14		28.2	30.8	74,485	80,086	579,127	0
Mar.			31	54.1	1	3	28.6	42.9	114,929	146,211	501,939	0
April			20	60.9	2		37.9	51.4	133,125	162,029	447,013	0
May			1	43.0	1	7	0	11.0	29,385	76,505	454,461	0
June			28	57.5	1	5	28.1	37.9	98,306	121,910	501,523	0
July			31	61.2	1	8	35.1	42.6	114,091	176,025	512,385	0
Aug.			15	98.0	31		0	35.6	95,221	179,376	498,782	0
Sept.			5	29.2	1	1	0	3.25	8,424	104,600	591,679	0
Oct.			4	27.4	1	1	0	1.37	3,672	74,966	617,269	0
Nov.			1	0	1	1	0	0	0	71,146	609,196	0
Dec.			1	0	1	1	0	0	0	112,878	700,894	0
Yearly				98.0			0	22.1	697,282	1,415,837	6,000,505	0

φ Mean daily

1 And other days

09-5220.00 COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY - DISCHARGES

DESCRIPTION: Water-stage recorder on the left (Arizona) bank and cableway at the point where the northerly international land boundary (California-Baja California) intersects the Colorado River, about 10.3 kilometres downstream from Colorado River below Yuma Main Canal Wasteway, 8.0 kilometres west of Yuma, Arizona, 1.8 kilometres upstream from Morelos Diversion Structure, and about 1.6 kilometres downstream from Rockwood Gate. Zero of the gage is at mean sea level, U. S. C. & G. S. datum. On May 1, 1988, the gage was relocated 52 metres upstream of the old gage on the left bank. Zero of the new gage is at mean sea level, U. S. C. & G. S. datum. Elevation of the new gage is equal to that of the old gage. Station is operated by the United States Section of the Commission.

RECORDS: Based on 196 current meter measurements during the year, 119 by the United States Section, 75 by the Mexican Section of the Commission, 2 by the U. S. Geological Survey, and a continuous record of gage heights. Discharges are computed on the basis of a water-stage recorder 512 metres upstream from the northerly international boundary where the remains of an old weir serve as a partial controlling section. A continuous gage height record is available November 15, 1948 through 1990; daily discharge records available January 1, 1950 through 1990.

REMARKS: Reservoirs on the Colorado River, including Lake Mead above Hoover Dam, where storage began in 1935, reservoirs on the Gila River, and many irrigation diversions and return flows regulate the river flow at this station except for infrequent flood flows. During 1990 the flow at this point represented the total amount of the Colorado River water which crossed the northerly international boundary.

EXTREMES: Prior to January 1935: Maximum instantaneous discharge estimated about 7,080 m³/sec, January 22, 1916; minimum discharge, no flow several days during August and September 1934; average annual flow 16,581,806,000 m³; maximum annual flow 31,429,325,000 m³, 1907; minimum annual flow 1,448,117,000 m³, 1934. Since January 1935: Maximum instantaneous discharge 1,150 m³/sec on August 20, 1983, minimum discharge, no flow during April 1935.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	42.5	49.6	62.6	83.0	70.5	59.2	70.8	70.5	43.6	32.3	31.4	35.4
2	39.9	49.3	62.6	81.8	61.5	63.4	67.4	64.9	39.1	32.0	31.4	34.3
3	40.8	47.9	61.5	81.8	54.4	66.3	67.7	62.6	38.2	42.8	31.4	36.2
4	41.1	50.4	62.0	81.6	48.7	59.5	66.8	60.0	75.0	56.1	31.4	36.2
5	41.1	50.1	67.7	81.3	46.2	56.1	67.1	60.3	101	33.4	33.1	36.2
6	40.5	48.1	68.5	82.1	44.5	54.4	69.1	57.8	68.0	31.4	31.7	36.8
7	40.8	48.1	69.1	82.1	39.9	54.4	71.9	57.2	38.8	30.9	32.3	36.8
8	40.2	48.1	70.2	81.8	40.2	54.7	70.0	57.8	36.8	30.0	33.1	36.5
9	40.8	47.0	70.5	83.8	41.1	54.1	69.7	58.3	37.7	30.9	32.6	37.1
10	39.9	48.7	70.8	83.5	37.9	54.1	68.0	58.9	51.5	30.0	32.3	37.7
11	40.5	57.5	72.8	82.4	37.1	59.5	68.3	58.1	48.4	29.2	32.3	38.5
12	40.5	60.9	73.1	83.8	36.8	59.8	68.8	60.0	69.4	30.0	32.9	38.8
13	40.8	56.9	73.9	83.5	36.8	61.2	70.8	65.1	45.9	29.7	33.7	38.5
14	40.8	72.8	77.3	83.0	38.8	61.2	71.6	96.9	36.5	30.0	33.4	39.4
15	40.5	62.6	75.9	83.3	40.8	61.5	70.5	141	36.8	29.7	32.6	39.6
16	39.9	60.6	77.3	83.0	39.9	60.6	69.7	114	36.8	30.6	32.3	38.5
17	41.3	60.9	77.6	81.8	39.1	60.9	72.5	89.2	37.1	28.6	32.9	41.3
18	41.1	60.3	80.7	83.5	38.8	68.8	72.5	109	38.2	30.6	34.0	41.1
19	40.5	65.4	81.3	83.0	38.8	72.2	72.2	86.7	39.4	29.5	32.3	40.5
20	40.8	66.6	81.6	83.0	38.2	72.8	71.1	77.9	39.4	28.6	32.6	41.1
21	48.1	63.7	80.4	82.4	42.2	75.6	70.5	60.0	37.4	29.5	33.4	40.8
22	47.9	66.0	80.4	82.4	42.5	75.6	69.7	58.3	38.5	29.2	33.4	37.9
23	49.6	66.0	80.1	81.3	43.6	75.0	73.3	60.3	37.4	30.0	33.4	39.4
24	50.1	66.8	80.4	80.1	43.9	75.9	72.5	60.0	38.2	30.9	34.0	41.6
25	50.7	66.8	82.4	78.2	43.6	77.9	72.2	60.3	38.2	29.7	32.9	42.2
26	50.4	69.4	82.7	77.9	44.5	79.3	73.6	60.0	38.5	30.0	32.9	44.5
27	48.1	71.4	83.3	76.5	46.2	77.9	74.5	67.1	38.5	29.5	33.7	43.6
28	55.8	68.8	83.0	76.5	53.8	79.3	75.0	62.0	38.5	30.3	34.8	43.0
29	53.5		83.8	75.9	54.1	79.6	72.8	62.3	38.5	30.3	34.3	41.3
30	52.7		83.5	75.9	54.9	79.9	74.2	60.9	36.2	31.2	36.0	42.5
31	51.8		83.8		58.1		76.7	51.3		31.7		42.8
Sum		1,650.7		2,440.2		1,990.7		2,168.7		978.6		1,220.1
	1,373.0		2,340.8		1,397.4		2,201.5		1,337.5		988.5	

Current Year 1990

Period 1935-1990

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres				
	High	Low	Day	High		Low		Total	Average	Maximum	Minimum	
				Day	Day							
Jan.	31.49	31.25	28	58.1	9	39.1	44.3	118,627	531,573	2,027,841	39,348	
Feb.	31.75	31.31	14	80.4	9	46.2	59.0	142,620	437,917	1,705,506	74,502	
Mar.	31.82	31.49	29	85.2	4	60.0	75.5	202,245	456,113	1,553,817	23,930	
April	31.89	31.69	15	90.9	29	70.5	81.3	210,833	380,311	1,322,616	0	
May	31.74	31.26	1	77.6	27	33.7	45.1	120,735	374,281	1,419,735	88,077	
June	31.82	31.48	26	81.0	6	53.2	66.4	171,996	378,861	1,629,906	10,485	
July	31.83	31.59	31	82.1	2	65.1	71.0	190,210	404,427	2,303,937	30,097	
Aug.	32.36	31.36	15	176	31	46.4	70.0	187,376	420,277	2,485,718	54,026	
Sept.	32.13	30.97	4	127	30	29.7	44.6	115,560	365,727	2,286,076	66,424	
Oct.	31.62	31.13	4	74.8	5	22.9	31.6	84,551	358,904	2,417,702	52,985	
Nov.	31.30	31.15	30	40.2	25	30.3	33.0	85,406	397,427	1,889,976	51,070	
Dec.	31.40	31.17	26	47.9	2	32.6	39.4	105,417	502,697	2,259,735	51,806	
Yearly	32.36	30.97		176		22.9	55.0	1,735,576	5,008,495	19,033,104	890,696	

09-5220.01 COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY - STAGES

(See Preceding Page for Description)

MEAN DAILY GAGE HEIGHT IN METRES 1990

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	31.32	31.39	31.52	31.81	31.67	31.52	31.69	31.71	31.33	31.21	31.22	31.22
2	31.30	31.37	31.51	31.79	31.55	31.55	31.64	31.61	31.28	31.20	31.20	31.18
3	31.29	31.33	31.52	31.79	31.46	31.57	31.63	31.58	31.27	31.30	31.20	31.20
4	31.29	31.37	31.53	31.79	31.37	31.51	31.60	31.54	31.58	31.44	31.20	31.23
5	31.31	31.39	31.60	31.78	31.33	31.51	31.61	31.51	31.88	31.23	31.21	31.23
6	31.30	31.35	31.60	31.79	31.34	31.50	31.64	31.47	31.56	31.21	31.19	31.23
7	31.30	31.33	31.61	31.79	31.29	31.50	31.70	31.46	31.26	31.21	31.20	31.25
8	31.29	31.32	31.63	31.80	31.32	31.50	31.69	31.47	31.25	31.20	31.21	31.25
9	31.30	31.32	31.64	31.82	31.35	31.50	31.67	31.48	31.27	31.21	31.20	31.26
10	31.29	31.34	31.63	31.82	31.30	31.49	31.66	31.50	31.46	31.21	31.20	31.27
11	31.29	31.46	31.66	31.80	31.29	31.57	31.64	31.48	31.42	31.19	31.20	31.29
12	31.29	31.48	31.66	31.82	31.31	31.58	31.64	31.50	31.44	31.19	31.20	31.29
13	31.29	31.45	31.67	31.81	31.29	31.60	31.67	31.58	31.40	31.18	31.21	31.28
14	31.29	31.67	31.73	31.82	31.30	31.61	31.69	31.88	31.26	31.18	31.21	31.28
15	31.28	31.49	31.70	31.82	31.33	31.62	31.66	32.17	31.27	31.18	31.20	31.30
16	31.28	31.49	31.71	31.82	31.32	31.58	31.62	32.01	31.28	31.19	31.20	31.28
17	31.28	31.48	31.71	31.81	31.29	31.57	31.67	31.83	31.28	31.17	31.20	31.30
18	31.28	31.49	31.76	31.82	31.29	31.66	31.71	31.96	31.28	31.18	31.21	31.31
19	31.26	31.55	31.76	31.82	31.30	31.71	31.72	31.81	31.28	31.17	31.20	31.30
20	31.26	31.56	31.77	31.82	31.28	31.71	31.73	31.73	31.28	31.17	31.19	31.29
21	31.35	31.56	31.75	31.82	31.33	31.74	31.72	31.53	31.27	31.18	31.20	31.27
22	31.34	31.60	31.75	31.82	31.35	31.75	31.70	31.49	31.28	31.18	31.22	31.23
23	31.37	31.60	31.75	31.81	31.38	31.74	31.74	31.51	31.29	31.18	31.22	31.24
24	31.36	31.60	31.76	31.81	31.39	31.75	31.74	31.51	31.27	31.19	31.23	31.27
25	31.38	31.62	31.78	31.77	31.38	31.79	31.72	31.52	31.26	31.20	31.22	31.28
26	31.36	31.62	31.78	31.76	31.39	31.81	31.70	31.53	31.26	31.20	31.22	31.35
27	31.32	31.64	31.78	31.74	31.40	31.78	31.72	31.65	31.27	31.21	31.22	31.31
28	31.45	31.65	31.79	31.74	31.49	31.79	31.73	31.58	31.28	31.21	31.24	31.27
29	31.40		31.80	31.74	31.48	31.80	31.68	31.56	31.29	31.21	31.23	31.25
30	31.38		31.80	31.73	31.46	31.80	31.70	31.53	31.28	31.21	31.26	31.26
31	31.39		31.81		31.51		31.74	31.42		31.21		31.27
Avg.	31.32	31.48	31.69	31.80	31.37	31.64	31.68	31.62	31.34	31.21	31.21	31.27

WESTERN BOUNDARY WATER BULLETIN - 1990 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

09-5318.50 COOPER WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir on wasteway for discharging regulatory waste water from the Cooper Canal to the Colorado River. This wasteway is located 0.8 kilometre downstream from the northerly international boundary and 1.0 kilometre upstream from Morelos Diversion Dam. Prior to July 14, 1971, the wasteway was located 0.6 kilometre downstream from Morelos Diversion Dam. This wasteway discharges waste water from the Valley Division of the Yuma Project in the United States into the Colorado River. Since July 14, 1971, zero of the gage is 35.86 metres above mean sea level, U. S. C. & G. S. datum.

RECORDS: Flow is computed from head on the weir measured by the water-stage recorder and weir rating determined by current meter measurements. Station operated by the United States Section of the Commission. Records available: Daily discharge March 1950 through 1990 obtained by the United States Section; monthly discharge, January 1934 through 1950 by the Bureau of Reclamation.

EXTREMES: Prior to March 1950, maximum monthly discharge 1,127,000 m³ in January 1940; minimum monthly discharge, zero for various months. Since March 1950, maximum instantaneous discharge, 2.25 m³/sec on June 19, 1965, at a maximum gage height of 34.79 metres (old datum); minimum instantaneous discharge, zero during parts of most months.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0.04	0.02	0.01	0	0.06	0.07	0	0.14	0.05	0.02	0
2	0	.03	.08	0	.17	.01	.01	0	.01	0	0	.07
3	0	.05	.09	0	.19	.01	0	0	.01	0	0	.01
4	.07	.18	.09	0	.01	.01	0	0	.02	0	.01	0
5	.02	.09	0	.06	.13	.01	0	0	.14	.01	.08	0
6	.24	.07	0	.17	.05	.14	.07	0	.03	.01	.01	0
7	.25	.04	0	.06	0	.24	.03	0	.03	.33	.01	.10
8	.12	.14	0	0	0	.06	0	.01	.01	.14	0	.16
9	.24	0	.07	0	0	.08	0	.04	.05	.03	.05	.01
10	.03	.14	.17	.05	0	.05	.02	.01	.03	0	.16	0
11	.13	.37	.11	0	.05	0	.02	.05	0	0	.01	.01
12	.22	0	.10	0	.18	.01	.02	.06	0	.04	.03	.19
13	.01	.06	.10	0	.18	0	0	.03	0	0	.16	.04
14	.07	.03	.12	0	.11	0	0	.11	0	0	.04	.08
15	0	.14	.16	.15	.05	.05	0	.02	.07	0	.12	.06
16	.15	.01	.05	0	0	.01	.02	0	.03	.01	.09	.16
17	.03	.06	.10	0	0	0	0	0	.01	0	0	.16
18	.06	.07	.17	0	.09	0	0	0	.03	0	.03	.01
19	.03	0	0	0	.08	0	0	0	.05	0	0	.18
20	0	0	0	0	.08	0	0	.05	0	.04	.08	.10
21	0	.08	0	.17	.01	.16	0	.12	.02	.08	.08	.09
22	0	.01	0	.15	.05	.02	0	.08	0	.06	.03	.07
23	0	0	.19	.05	.05	0	0	.06	.12	.20	.01	.02
24	.10	.10	.07	.01	.04	.01	0	.07	.03	.14	0	0
25	.22	.09	.16	0	.04	.08	0	.06	0	.01	.15	0
26	.10	.11	.01	.04	0	.03	0	.16	.06	.02	.19	0
27	.15	.16	0	.04	.06	0	0	.02	.03	0	.08	.05
28	.01	.10	.07	.01	0	0	.06	0	0	.03	.02	.01
29	0	0	.01	0	0	.02	0	0	0	.01	.08	.17
30	0	0	0	0	.13	.03	0	0	.01	0	0	.04
31	0	0	.15	.01	.01	0	0	.20	0	.06	0	.22
Sum	2.25	2.17	2.09	0.97	1.76	1.09	0.32	1.15	0.93	1.27	1.54	2.01

Current Year 1990

Period 1935-1990

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	0.70	0	16	1.41	1	0	0.07	194	190	1,127	0
Feb.	.61	0	11	1.15	1	0	.08	187	165	493	7.4
Mar.	.80	0	17	1.73	1	0	.07	181	179	638	0
April	.59	0	15	1.07	1	0	.03	83.8	178	524	20.6
May	.71	0	5	1.43	1	0	.06	152	179	543	39.1
June	.75	0	7	1.56	4	0	.04	94.2	163	734	27.9
July	.40	0	1	.59	1	0	.01	27.6	155	636	0
Aug.	.63	0	14	1.21	1	0	.04	99.4	123	761	0
Sept.	.78	0	5	1.65	2	0	.03	80.4	125	570	0
Oct.	.78	0	7	1.65	1	0	.04	110	158	604	0
Nov.	.63	0	25	1.20	1	0	.05	133	183	570	11.1
Dec.	.60	0	11	1.12	1	0	.06	174	208	730	16.9
Yearly	0.80	0		1.73		0	0.05	1,516	2,006	5,551	787

! And other days

09-5220.21 COLORADO RIVER IMMEDIATELY ABOVE MORELOS DAM - STAGES

DESCRIPTION: Water-stage recorder located on the right bank of the Colorado River in Mexico attached to the upstream abutment of the gates of the Intake Canal at Morelos Dam, 1.8 kilometres downstream from the northerly international boundary, and about 12.1 kilometres downstream from the Colorado River below Yuma Main Canal Wasteway. Since April 17, 1969, zero of the gage is at mean sea level, U. S. C. & G. S. datum; prior to that date, zero of the gage was 0.05 metre below mean sea level.

RECORDS: Records obtained and furnished by the Mexican Section of the Commission. Records available: Staff gage height records November 8, 1950 to June 3, 1951; a continuous record of gage heights June 4, 1951 through 1990.

REMARKS: Prior to June 4, 1951, when a continuous water-stage recorder was installed, mean daily gage height records were determined from hourly readings of a staff gage.

EXTREMES: Since November 8, 1950: Maximum mean daily elevation above mean sea level, 34.88 metres on August 18, 1983; minimum mean daily elevation above mean sea level, 30.94 metres on February 17, 1957.

MEAN DAILY GAGE HEIGHT IN METRES 1990

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	31.34	31.40	31.50	31.76	31.59	31.44	31.59	31.60	31.22	31.10	31.09	31.09
2	31.31	31.38	31.50	31.74	31.47	31.45	31.53	31.51	31.18	31.09	31.08	31.06
3	31.30	31.35	31.50	31.74	31.38	31.47	31.52	31.47	31.17	31.20	31.08	31.07
4	31.30	31.38	31.51	31.73	31.30	31.42	31.51	31.43	31.47	31.30	31.07	31.10
5	31.31	31.41	31.58	31.72	31.26	31.43	31.51	31.40	31.74	31.11	31.09	31.09
6	31.30	31.36	31.58	31.73	31.27	31.42	31.54	31.36	31.46	31.10	31.08	31.10
7	31.30	31.35	31.59	31.74	31.22	31.42	31.61	31.35	31.18	31.09	31.08	31.11
8	31.30	31.34	31.60	31.74	31.26	31.43	31.60	31.36	31.16	31.10	31.09	31.12
9	31.31	31.33	31.61	31.76	31.29	31.42	31.59	31.37	31.18	31.10	31.08	31.13
10	31.30	31.35	31.60	31.76	31.25	31.41	31.56	31.39	31.36	31.09	31.08	31.14
11	31.30	31.47	31.63	31.75	31.24	31.49	31.54	31.37	31.32	31.09	31.08	31.15
12	31.30	31.48	31.64	31.76	31.26	31.49	31.55	31.39	31.53	31.08	31.08	31.15
13	31.31	31.46	31.65	31.75	31.23	31.50	31.56	31.48	31.30	31.07	31.08	31.14
14	31.31	31.67	31.70	31.75	31.25	31.52	31.58	31.77	31.17	31.07	31.08	31.16
15	31.31	31.49	31.67	31.75	31.27	31.52	31.56	31.99	31.17	31.07	31.07	31.17
16	31.29	31.48	31.68	31.75	31.26	31.48	31.51	31.84	31.16	31.08	31.08	31.15
17	31.30	31.48	31.68	31.74	31.24	31.47	31.55	31.69	31.17	31.06	31.08	31.17
18	31.30	31.49	31.73	31.76	31.23	31.55	31.60	31.77	31.17	31.07	31.09	31.18
19	31.28	31.55	31.73	31.75	31.23	31.60	31.61	31.67	31.18	31.07	31.07	31.16
20	31.28	31.55	31.73	31.75	31.22	31.61	31.60	31.59	31.18	31.06	31.06	31.15
21	31.37	31.54	31.72	31.75	31.26	31.64	31.59	31.39	31.17	31.07	31.07	31.13
22	31.35	31.59	31.71	31.75	31.29	31.65	31.56	31.34	31.18	31.07	31.10	31.10
23	31.38	31.59	31.71	31.74	31.32	31.64	31.60	31.37	31.17	31.07	31.10	31.11
24	31.37	31.61	31.72	31.72	31.32	31.65	31.59	31.37	31.16	31.08	31.11	31.13
25	31.39	31.61	31.74	31.69	31.31	31.69	31.58	31.39	31.15	31.08	31.10	31.14
26	31.37	31.63	31.74	31.68	31.32	31.70	31.59	31.39	31.15	31.09	31.10	31.21
27	31.35	31.63	31.74	31.66	31.33	31.67	31.61	31.51	31.16	31.09	31.10	31.17
28	31.46	31.62	31.75	31.66	31.42	31.68	31.62	31.44	31.17	31.09	31.11	31.13
29	31.41		31.76	31.66	31.42	31.69	31.57	31.42	31.18	31.09	31.11	31.12
30	31.38		31.76	31.65	31.38	31.69	31.59	31.40	31.17	31.09	31.13	31.13
31	31.40		31.76		31.42		31.64	31.31		31.08		31.13
Avg.	31.33	31.49	31.66	31.73	31.31	31.54	31.57	31.49	31.24	31.09	31.09	31.13

09-5220.30 INTAKE CANAL AT MORELOS DIVERSION STRUCTURE - DISCHARGES

DESCRIPTION: Water-stage recorder and staff gage on left bank of Intake Canal, 61 metres downstream from the intake at Morelos Dam, 410 metres upstream from the point where it joins the old Alamo Canal, 3.5 kilometres upstream from Matamoros Check, and about 1.6 kilometres south of the northerly international boundary. The zero of the gage is 0.05 metre below mean sea level, U. S. C. & G. S. datum.

RECORDS: The records are deduced from the flows arriving in the limitrophe section of the Colorado River at the northerly international boundary, the flows that pass downstream from the structure, and leakage through the structure. Records available: November 8, 1950 through 1990. Records obtained and furnished by the Mexican Section of the Commission.

REMARKS: The canal is operated with a minimum hydraulic slope to permit the maximum retention of silt above Matamoros Check, and the lower velocities in the canal do not permit measuring the flow with a current meter. Records for this station show the amounts of Colorado River water diverted at Morelos Diversion Dam to the Intake Canal and thence to the Alamo Canal for use in Mexico. Under conditions set forth in the 1944 Water Treaty, water for use in Mexico may be diverted to the Alamo Canal in the United States directly from the river at Rockwood Heading or by means of Imperial Dam, the All-American Canal, and certain facilities of the Imperial Irrigation District. No diversions of this nature have been made during the years 1951 through 1990, and consequently the records reported below show the total water diverted from the Colorado River to the Alamo Canal during those years. Mexico occasionally pumps water from the Colorado River at other points below Morelos Dam when water is available in the channel.

EXTREMES: Maximum mean daily discharge, 187 m³/sec, July 12 and 14, 1983; maximum mean daily gage height, 32.71 metres March 30 and 31, 1985, and March 1, 1986. Minimum daily discharge, no flow on various occasions.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	42.5	49.6	62.6	83.0	70.5	59.2	70.9	70.5	43.8	32.3	31.5	35.4
2	39.9	49.3	62.7	81.8	61.6	63.4	67.4	64.9	39.1	32.0	31.4	34.4
3	40.8	47.9	61.5	81.8	54.6	66.3	67.7	62.6	38.2	42.7	31.4	36.2
4	41.1	50.6	62.1	81.6	48.7	59.5	66.8	60.0	59.6	52.9	31.4	36.2
5	41.1	50.2	67.7	81.3	46.3	56.1	67.1	60.3	73.4	33.4	33.2	36.2
6	40.7	48.2	68.5	82.3	44.5	54.5	69.2	57.8	64.0	31.4	31.7	36.8
7	41.0	48.2	69.1	82.2	39.9	54.6	72.0	57.2	38.8	31.2	32.3	36.9
8	40.3	48.3	70.2	81.8	40.2	54.7	70.0	57.8	36.8	30.2	33.1	36.7
9	41.0	47.0	70.6	83.8	41.1	54.2	70.0	58.4	37.7	30.9	32.6	37.1
10	40.0	48.9	71.0	83.6	37.9	54.1	68.0	58.9	51.6	30.0	32.5	37.7
11	40.6	57.9	72.9	82.4	37.2	59.5	68.3	58.1	48.4	29.2	32.3	38.5
12	40.7	60.9	73.2	83.8	37.0	59.8	68.8	60.1	68.9	30.0	32.9	39.0
13	40.8	57.0	74.0	83.5	37.0	61.2	70.8	65.2	45.9	29.7	33.9	38.5
14	40.8	72.8	77.4	83.0	38.9	61.2	71.6	97.0	36.5	30.0	33.4	39.4
15	40.5	62.7	76.1	83.4	40.8	61.5	70.5	103	36.9	29.7	32.7	39.7
16	40.1	60.6	77.4	83.0	39.9	60.6	69.7	91.7	36.8	30.6	32.4	38.7
17	41.4	60.9	77.7	81.8	39.1	60.9	72.5	89.2	37.1	28.6	32.9	41.5
18	41.1	60.4	80.9	83.5	38.9	68.8	72.5	92.4	38.3	30.6	34.0	41.1
19	40.5	65.4	81.3	83.0	38.9	72.2	72.2	80.1	39.4	29.5	32.3	40.7
20	40.8	66.6	81.6	83.0	38.3	72.8	71.1	77.9	39.4	28.7	32.7	41.2
21	48.1	63.8	80.4	82.6	42.2	75.8	70.5	60.2	37.4	29.5	33.5	40.9
22	47.9	66.0	80.4	82.6	42.5	75.6	70.0	58.4	38.5	29.2	33.4	38.0
23	49.6	66.0	80.3	81.3	43.7	75.0	73.3	60.4	37.5	30.2	33.4	39.4
24	50.2	66.9	80.5	80.1	43.9	75.9	72.5	60.1	38.3	31.0	34.0	41.6
25	50.9	66.9	82.6	78.2	43.6	78.0	72.2	60.4	38.2	29.7	33.0	42.2
26	50.5	69.5	82.7	77.9	44.5	79.3	73.6	60.2	38.6	30.0	33.0	44.5
27	48.3	71.5	83.3	76.5	46.2	77.9	74.5	67.1	38.5	29.5	33.8	43.7
28	55.8	68.9	83.0	76.5	53.8	79.3	75.1	62.0	38.5	30.3	34.9	43.0
29	53.5		83.8	75.9	54.1	79.6	72.8	62.3	38.5	30.3	34.4	41.5
30	52.7		83.5	75.9	55.1	79.9	74.2	60.9	36.2	31.2	36.0	42.5
31	51.8		84.0		58.1		76.7	51.5		31.8		43.0
Sum	1,375.0	1,652.9	2,343.0	2,441.1	1,399.0	1,991.4	2,202.5	2,086.6	1,290.8	976.3	990.0	1,222.2
Current Year 1990										Period 1950-1990		
Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres				
	High	Low	Day	φ High	Day	φ Low		Total	Average	Maximum	Minimum	
Jan.			28	55.8	2	39.9	44.4	118,800	109,434	275,305	1,192	
Feb.			14	72.8	9	47.0	59.0	142,811	107,903	251,580	11,387	
Mar.			31	84.0	3	61.5	75.6	202,435	231,616	431,370	120,761	
April			19	83.8	129	75.9	81.4	210,911	261,273	404,698	189,700	
May			30	70.5	12	57.0	45.1	120,874	138,845	286,174	81,665	
June			31	79.9	10	54.1	66.4	172,057	198,576	332,588	117,400	
July			31	76.7	4	66.8	71.0	190,296	275,699	439,171	155,105	
Aug.			15	103	31	51.5	67.3	180,282	273,062	420,673	160,721	
Sept.			5	73.4	30	36.2	43.0	111,525	163,135	336,960	66,156	
Oct.			4	52.9	17	28.6	31.5	84,352	88,164	280,817	12,894	
Nov.			30	36.0	12	31.4	33.0	85,536	75,187	258,388	9,271	
Dec.			26	44.5	2	34.4	39.4	105,598	111,898	247,899	10,886	
Yearly				103		28.6	54.7	1,725,477	2,034,792	3,451,533	1,569,404	

φ Mean daily

! And other days

09-5220.31 INTAKE CANAL AT MORELOS DIVERSION STRUCTURE - STAGES

(See Preceding Page for Description)

MEAN DAILY GAGE HEIGHT IN METRES 1990

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	31.19	31.25	31.35	31.63	31.47	31.32	31.49	31.54	31.14	30.90	31.02	30.90
2	31.14	31.21	31.34	31.61	31.35	31.30	31.43	31.44	31.09	30.86	31.00	30.87
3	31.10	31.16	31.36	31.61	31.25	31.31	31.42	31.40	31.08	31.01	30.97	30.88
4	31.09	31.21	31.36	31.60	31.16	31.28	31.39	31.36	31.30	31.22	30.96	30.97
5	31.13	31.25	31.43	31.59	31.11	31.33	31.40	31.32	31.44	30.98	31.00	31.00
6	31.12	31.18	31.43	31.60	31.11	31.32	31.45	31.27	31.39	31.02	30.97	30.99
7	31.12	31.15	31.45	31.61	31.06	31.32	31.52	31.25	31.09	31.01	30.90	31.07
8	31.12	31.12	31.47	31.62	31.13	31.33	31.52	31.26	31.04	31.03	30.91	31.10
9	31.13	31.11	31.46	31.63	31.18	31.32	31.50	31.28	31.11	31.04	30.90	31.11
10	31.12	31.15	31.46	31.63	31.13	31.31	31.48	31.31	31.28	31.03	30.90	31.12
11	31.12	31.31	31.49	31.61	31.13	31.40	31.46	31.29	31.24	31.00	30.88	31.15
12	31.12	31.31	31.50	31.63	31.15	31.40	31.47	31.31	31.44	30.96	30.89	31.14
13	31.13	31.29	31.51	31.62	31.12	31.41	31.49	31.41	31.19	30.89	30.88	31.13
14	31.13	31.52	31.56	31.61	31.12	31.43	31.52	31.67	30.98	30.91	30.85	31.14
15	31.13	31.34	31.54	31.62	31.15	31.43	31.49	31.75	30.99	30.92	30.82	31.16
16	31.08	31.33	31.54	31.62	31.13	31.38	31.44	31.68	30.99	30.97	30.81	31.13
17	31.10	31.33	31.54	31.60	31.10	31.37	31.48	31.67	31.00	30.90	30.81	31.15
18	31.12	31.34	31.59	31.62	31.07	31.46	31.53	31.69	30.98	30.88	30.84	31.17
19	31.08	31.41	31.59	31.61	31.08	31.51	31.54	31.61	31.00	30.85	30.79	31.15
20	31.07	31.40	31.60	31.62	31.06	31.52	31.53	31.54	31.06	30.81	30.80	31.12
21	31.20	31.39	31.58	31.63	31.13	31.56	31.52	31.34	31.08	30.84	30.80	31.06
22	31.17	31.45	31.57	31.63	31.17	31.57	31.48	31.26	31.08	30.87	30.81	30.93
23	31.22	31.45	31.58	31.62	31.19	31.56	31.52	31.29	31.09	30.93	30.82	30.91
24	31.18	31.47	31.58	31.60	31.20	31.59	31.53	31.30	31.05	30.97	30.85	31.02
25	31.22	31.47	31.61	31.56	31.19	31.61	31.52	31.31	31.00	31.00	30.88	31.06
26	31.19	31.49	31.60	31.56	31.20	31.62	31.53	31.32	30.99	30.99	30.83	31.20
27	31.15	31.49	31.60	31.54	31.18	31.58	31.54	31.45	31.03	30.96	30.84	31.14
28	31.29	31.48	31.60	31.54	31.28	31.60	31.55	31.38	31.07	30.93	30.88	31.03
29	31.22		31.62	31.54	31.30	31.60	31.49	31.36	31.09	30.92	30.89	30.97
30	31.19		31.62	31.53	31.22	31.60	31.52	31.34	31.09	30.92	30.96	30.99
31	31.23		31.63		31.29		31.57	31.26		30.92		31.05
Avg.	31.15	31.32	31.52	31.60	31.17	31.44	31.49	31.41	31.11	30.95	30.88	31.06

09-5220.41 COLORADO RIVER IMMEDIATELY BELOW MORELOS DAM - STAGES

DESCRIPTION: Water-stage recorder located on the right bank of the Colorado River in Mexico immediately downstream from Morelos Dam, 1.8 kilometres downstream from the northerly international boundary, and about 12.1 kilometres downstream from the Colorado River below Yuma Main Canal Wasteway. Since April 17, 1969, zero of the gage is at mean sea level, U. S. C. & G. S. datum; prior to that date, zero of the gage was 0.05 metre below mean sea level.

RECORDS: Records obtained and furnished by the Mexican Section of the Commission. Records available: Staff gage heights, February 20, 1951 to June 6, 1966; continuous record of gage heights June 7, 1966 through 1990.

REMARKS: On June 7, 1966 a continuous water-stage recorder was installed; prior to this date, mean daily gage heights were determined from hourly readings of staff gage.

EXTREMES: Maximum mean daily gage height, 34.74 metres on August 18, 1983; minimum mean gage height, 29.64 metres on several days during October 1988.

MEAN DAILY GAGE HEIGHT IN METRES 1990

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	29.75	29.74	29.74	29.78	29.76	29.78	29.85	29.87	29.70	29.72	29.58	29.58
2	29.75	29.74	29.74	29.78	29.76	29.77	29.85	29.86	29.69	29.72	29.58	29.58
3	29.75	29.74	29.74	29.76	29.75	29.77	29.84	29.86	29.69	29.70	29.57	29.57
4	29.74	29.74	29.74	29.76	29.74	29.78	29.84	29.85	30.33	30.30	29.57	29.57
5	29.74	29.74	29.74	29.76	29.74	29.78	29.84	29.85	31.38	29.65	29.57	29.57
6	29.73	29.74	29.74	29.76	29.74	29.78	29.84	29.84	30.41	29.61	29.57	29.58
7	29.73	29.74	29.74	29.76	29.74	29.79	29.85	29.83	29.66	29.60	29.58	29.60
8	29.74	29.74	29.74	29.77	29.74	29.79	29.85	29.83	29.71	29.59	29.59	29.61
9	29.75	29.74	29.74	29.76	29.74	29.79	29.85	29.83	29.74	29.59	29.59	29.61
10	29.75	29.74	29.74	29.77	29.74	29.79	29.84	29.83	29.74	29.59	29.58	29.60
11	29.75	29.74	29.74	29.77	29.74	29.79	29.84	29.83	29.74	29.60	29.58	29.60
12	29.75	29.74	29.74	29.78	29.74	29.80	29.84	29.83	29.90	29.60	29.57	29.60
13	29.75	29.74	29.74	29.78	29.74	29.82	29.84	29.83	29.74	29.60	29.57	29.62
14	29.75	29.74	29.74	29.78	29.74	29.82	29.85	29.92	29.73	29.59	29.58	29.66
15	29.75	29.74	29.74	29.78	29.74	29.82	29.85	31.85	29.73	29.60	29.58	29.66
16	29.75	29.74	29.74	29.78	29.74	29.81	29.85	31.17	29.73	29.60	29.58	29.66
17	29.75	29.74	29.74	29.78	29.74	29.81	29.85	30.00	29.73	29.60	29.58	29.65
18	29.74	29.74	29.75	29.78	29.74	29.89	29.85	31.04	29.73	29.60	29.58	29.64
19	29.74	29.74	29.75	29.78	29.75	29.83	29.85	30.32	29.73	29.61	29.58	29.60
20	29.74	29.74	29.75	29.78	29.75	29.83	29.85	29.81	29.73	29.62	29.57	29.59
21	29.74	29.74	29.75	29.78	29.75	29.83	29.85	29.75	29.73	29.59	29.57	29.59
22	29.74	29.74	29.74	29.78	29.75	29.84	29.86	29.73	29.73	29.58	29.57	29.56
23	29.74	29.74	29.75	29.77	29.76	29.84	29.85	29.72	29.73	29.58	29.56	29.56
24	29.77	29.74	29.75	29.77	29.76	29.85	29.85	29.72	29.73	29.58	29.57	29.56
25	29.79	29.74	29.75	29.77	29.76	29.85	29.85	29.72	29.73	29.59	29.57	29.56
26	29.74	29.74	29.75	29.77	29.77	29.85	29.85	29.71	29.73	29.58	29.57	29.56
27	29.74	29.74	29.75	29.77	29.76	29.85	29.85	29.71	29.73	29.58	29.57	29.56
28	29.74	29.74	29.75	29.77	29.76	29.89	29.86	29.71	29.73	29.58	29.57	29.55
29	29.74		29.75	29.77	29.76	29.86	29.86	29.70	29.73	29.58	29.57	29.55
30	29.74		29.77	29.76	29.76	29.86	29.86	29.70	29.73	29.58	29.57	29.54
31	29.74		29.79		29.80		29.87	29.70		29.58		29.55
Avg.	29.75	29.74	29.75	29.77	29.75	29.82	29.85	29.97	29.83	29.63	29.57	29.59

09-5319.00 WELLTON-MOHAWK DRAINAGE WATER DISCHARGED
TO COLORADO RIVER BELOW MORELOS DAM

DESCRIPTION: Water-stage recorder located on downstream end of the Wellton-Mohawk Drainage Extension Channel on the Arizona bank of the Colorado River at the east end of the weir section of Morelos Dam, 1.8 kilometre downstream from the northerly international boundary. The elevation of the zero of the gage has not been determined.

RECORDS: Based on discharge measurements and a continuous record of gage heights. Station is operated by the United States Section of the Commission. Records available: November 16, 1965 through 1990.

REMARKS: Pursuant to Minute 218 of the Commission, an extension to the Wellton-Mohawk Drainage Conveyance Channel was constructed along the left bank of the Colorado River to a point immediately below Morelos Dam, a distance of about 19.3 kilometres, and placed in operation on November 16, 1965. Drainage flows may be discharged on an emergency basis to the Gila River and thence to the Colorado River at the diversion structure, Main Outlet Drain Extension No. 1, at the upstream end of the extension; directly to the Colorado River at Main Outlet Drain Extension No. 2, 3.1 kilometres upstream from Morelos Dam; and directly to the Colorado River immediately below Morelos Dam at this station, Main Outlet Drain Extension No. 3. On July 14, 1972, Minute No. 241 of the Commission became effective. The Minute called for discharge of all Wellton-Mohawk drainage waters to be made below Morelos Dam. On August 30, 1973, Minute No. 242 of the Commission became effective. The Minute called for construction of a concrete-lined bypass drain from Morelos Dam to the Santa Clara Slough in Mexico. On June 23, 1977, the first flow was recorded in the bypass drain. Drainage flows through Main Outlet Extension No. 3 will be only on an emergency basis.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.01	0	0	0.07	0	0	0	0	0	0	0	0
2	0	0	0	0.07	0	0	0	0	0	0	0	0
3	0	0	0	.01	0	0	0	0	0	0	0	0
4	0	0	0	.01	0	0	0	0	0	0	0	0
5	0	0	0	.01	0	0	0	0	0	0	0	0
6	0	0	0	.01	0	0	0	0	0	0	0	0
7	0	0	0	.01	0	0	0	0	0	0	0	0
8	0	0	0	.01	0	0	0	0	0	0	0	0
9	0	0	0	.01	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	.03
14	0	0	0	0	0	0	0	0	0	0	0	.07
15	0	0	0	0	0	0	0	0	0	0	0	.07
16	0	0	0	0	0	0	0	0	0	0	0	.06
17	0	0	0	0	0	0	0	0	0	0	0	.06
18	0	0	0	0	0	.25	0	0	0	0	0	.04
19	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	.16	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	.09	0	0	0	0	0	0	0	0	0
31	0	0	.13	0	.09	0	0	0	0	0	0	0
Sum	0.01	0	0.22	0.21	0.09	0.41	0	0	0	0	0	0.33

Current Year 1990

Period 1966-1990

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	0.02	0	1	0.01	1	0	0	0.9	9,577	23,088	0
Feb.	0	0	1	0	1	0	0	0	7,455	20,959	0
Mar.	.08	0	130	.19	1	0	.01	19.0	5,260	22,827	0
April	.45	0	2	2.65	9	0	.01	18.1	4,711	22,944	0
May	.48	0	31	2.86	1	0	0	7.8	7,099	23,548	0
June	.67	0	18	4.81	1	0	.01	35.4	5,587	23,135	0
July	0	0	1	0	1	0	0	0	5,133	23,370	0
Aug.	0	0	1	0	1	0	0	0	5,219	23,668	0
Sept.	0	0	1	0	1	0	0	0	7,333	22,787	0
Oct.	0	0	1	0	1	0	0	0	10,322	23,683	0
Nov.	0	0	1	0	1	0	0	0	9,785	22,792	0
Dec.	.05	0	113	.08	1	0	.01	28.5	8,887	23,585	0
Yearly	0.67	0		4.81		0	0	110	86,368	264,928	0

† And other days

09-5325.00 ELEVEN MILE WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir on wasteway for discharging water from the West Main Canal to the Colorado River. This wasteway is located in Arizona, 6.9 kilometres downstream from the northerly international boundary and 5.1 kilometres downstream from Morelos Diversion Dam. It is the largest of three wasteways discharging waste water from the Valley Division of the Yuma Project in the United States into the limitrophe section of the Colorado River. Since June 1986, zero of the gage is 34.05 metres above mean sea level, U. S. C. & G. S. datum; prior to that date, zero of the gage was mean sea level, U. S. C. & G. S. datum.

RECORDS: Flow is computed from head on the weir measured by the water-stage recorder and weir rating determined by current meter measurements. Station operated by the United States Section of the Commission. Records available: Daily discharge, January 1951 through 1990, obtained by the United States Section; monthly discharge, January 1924 through 1950 by Bureau of Reclamation.

EXTREMES: Prior to January 1951, maximum monthly discharge, 12,014,000 m³ in August 1940; minimum monthly discharge, zero in April 1941. Since January 1, 1951, maximum instantaneous discharge, 22.7 m³/sec on December 3, 1961, at a maximum gage height of 35.84 metres; minimum instantaneous discharge, zero during parts of most years.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0.48	0.07	0	0	0.06	0.05	0	0.01	0
2	0	.01	.02	.34	0	0	0	.05	.12	0	.04	.72
3	0	0	.05	.07	0	0	0	0	.28	0	.03	.37
4	.08	.03	.72	.09	.01	0	0	0	.23	0	.67	.09
5	.12	.03	.31	.04	0	.03	0	0	0	.01	.41	.08
6	.15	.05	.15	0	.42	.03	0	0	0	.01	.01	.03
7	.18	.03	.08	0	.21	.01	0	0	0	.20	0	.04
8	.05	.08	0	.02	.10	0	0	0	0	0	0	0
9	.07	.10	0	.01	.07	0	0	0	0	0	0	0
10	0	0	.01	.01	0	0	.01	0	.01	0	.27	.05
11	0	0	.02	0	0	.01	.07	0	.01	0	.27	.06
12	.01	.01	.05	0	0	0	0	0	.04	0	.01	.02
13	.02	.06	0	0	.04	0	0	.01	.01	.01	.03	.06
14	.01	.01	0	.01	.01	0	0	.02	.02	0	0	.01
15	.06	.02	0	.03	.03	.01	0	.05	0	.01	.01	.06
16	.01	.01	0	.02	0	.01	0	0	0	.01	.04	.16
17	.09	.06	0	0	0	0	0	0	0	0	.05	.01
18	.05	.01	.01	0	.02	.02	0	.05	0	.01	.66	.03
19	.03	.01	.02	0	.08	.03	0	0	.03	0	.07	.07
20	.09	.03	.01	0	.02	.02	0	0	.04	0	.05	.04
21	.04	0	0	0	0	.01	0	.09	0	0	.05	.01
22	0	.05	.07	0	0	0	0	.16	.01	.02	.05	.14
23	0	.05	0	.01	0	.04	0	.03	.01	0	.06	0
24	.07	0	0	.02	0	0	0	.02	.02	0	.05	0
25	.04	0	0	.01	0	0	0	.02	0	0	.06	0
26	.12	.02	0	.02	0	0	0	.01	.02	0	.07	0
27	.01	.03	.03	.05	0	.01	.01	.01	.51	.01	0	.03
28	1.27	.03	0	.02	0	0	.01	0	.03	.03	0	.01
29	.41	0	.03	0	0	.03	.66	.03	0	.04	.11	.07
30	.01	0	0	0	0	.07	.56	.58	.15	.05	.03	0
31	0	0	0	0	0	0	.07	.07	0	.01	0	0
Sum	2.99	0.73	1.58	1.25	1.08	0.33	1.39	1.26	1.59	0.42	3.11	2.16

Current Year 1990

Period 1935-1990

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	1.06	0	28	6.15	1	0	0.10	258	2,986	11,804	0
Feb.	.10	0	13	.18	1	0	.03	63.1	2,445	10,398	17.9
Mar.	1.05	0	4	6.03	1	0	.05	137	2,299	7,685	72.9
April	.66	0	1	2.86	1	0	.04	108	2,125	7,771	0
May	.65	0	6	2.83	1	0	.03	93.3	2,507	11,496	10.2
June	.11	0	129	.20	1	0	.01	28.5	2,381	9,177	13.0
July	.79	0	29	3.85	1	0	.04	120	2,403	12,014	63.9
Aug.	.35	0	30	1.87	1	0	.04	109	2,079	12,014	63.9
Sept.	1.02	0	27	5.75	1	0	.05	137	1,501	7,574	7.4
Oct.	.27	0	7	1.32	1	0	.01	36.3	2,048	7,006	14.7
Nov.	.87	0	4	4.53	1	0	.10	269	2,494	10,139	23.2
Dec.	1.05	0	2	5.98	1	0	.07	187	3,259	11,632	76.4
Yearly	1.06	0		6.15		0	0.05	1,546	28,527	102,255	1,163

! And other days

09-5221.00 COLORADO RIVER AT ELEVEN MILE GAGE - STAGES

DESCRIPTION: Water-stage recorder on the left (Arizona) bank of the river, 6.9 kilometres downstream from northerly international boundary, 5.1 kilometres downstream from Morelos Dam, about 15 metres downstream from the mouth of Eleven Mile Wasteway of the Yuma Project, and 17.7 kilometres downstream from Yuma, Arizona, along the river levee. The zero of the gage is at mean sea level, U. S. C. & G. S. datum. On April 1, 1988, the gage was relocated 399 metres downstream of the old gage on the left bank. Zero of the new gage is at mean sea level, U. S. C. & G. S. datum. Elevation of the new gage is 0.12 metre lower than the old gage.

RECORDS: Mean daily gage heights based on continuous water-stage records. Records available: Continuous record of gage heights, November 1947 through 1990; once weekly readings obtained by the U. S. Bureau of Reclamation, January 1940 through October 1947.

REMARKS: This station is maintained by the United States Section of the Commission as part of the continuing study of channel conditions in the limitrophe section of the river.

EXTREMES: Since November 1947, maximum mean daily gage height, 33.15 metres on June 28, 1983; minimum mean daily gage height, 28.65 metres on September 13, 1988 and other days since that time.

MEAN DAILY GAGE HEIGHT IN METRES 1990

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	28.71	28.71	28.70	28.75	28.74	28.75	28.80	28.83	28.91	28.97	29.00	28.94
2	28.72	28.71	28.71	28.79	28.72	28.75	28.80	28.84	28.92	28.96	29.00	28.99
3	28.71	28.70	28.72	28.73	28.72	28.75	28.80	28.82	28.93	28.96	29.00	29.05
4	28.72	28.72	28.77	28.72	28.72	28.75	28.79	28.82	28.83	29.26	29.05	28.96
5	28.73	28.72	28.77	28.69	28.72	28.76	28.80	28.82	29.77	29.14	29.09	28.96
6	28.72	28.72	28.72	28.69	28.75	28.75	28.79	28.82	29.51	29.01	29.00	28.94
7	28.73	28.71	28.71	28.69	28.78	28.75	28.79	28.82	28.99	29.00	28.99	28.95
8	28.72	28.73	28.70	28.71	28.74	28.75	28.79	28.82	28.72	28.97	28.98	28.95
9	28.72	28.73	28.70	28.70	28.73	28.75	28.79	28.81	28.65	28.96	28.99	28.95
10	28.71	28.69	28.70	28.70	28.72	28.75	28.79	28.82	28.65	28.96	29.03	28.96
11	28.70	28.69	28.71	28.70	28.72	28.76	28.81	28.81	28.85	28.97	29.03	28.96
12	28.71	28.70	28.71	28.70	28.72	28.76	28.79	28.81	29.05	28.97	28.99	28.95
13	28.71	28.72	28.70	28.70	28.73	28.75	28.79	28.82	29.02	28.97	28.99	28.95
14	28.71	28.72	28.70	28.71	28.72	28.76	28.79	28.82	28.97	28.97	28.98	28.95
15	28.72	28.71	28.70	28.71	28.73	28.77	28.79	29.75	28.96	28.98	28.98	28.97
16	28.72	28.71	28.69	28.72	28.72	28.78	28.79	30.03	28.96	28.98	28.99	28.99
17	28.72	28.72	28.69	28.70	28.72	28.78	28.79	29.23	28.95	28.98	28.98	28.97
18	28.72	28.71	28.70	28.71	28.73	28.79	28.79	29.45	28.95	28.99	29.06	28.96
19	28.71	28.71	28.70	28.71	28.74	28.82	28.79	29.53	28.95	28.99	29.00	28.96
20	28.72	28.71	28.69	28.70	28.75	28.79	28.79	29.10	28.97	28.99	28.99	28.94
21	28.72	28.70	28.69	28.71	28.73	28.79	28.79	28.99	28.95	29.00	28.99	28.92
22	28.71	28.71	28.70	28.72	28.73	28.78	28.79	28.97	28.95	28.99	28.98	28.92
23	28.71	28.72	28.69	28.72	28.73	28.79	28.79	28.93	28.95	28.99	28.98	28.89
24	28.72	28.70	28.69	28.73	28.73	28.79	28.79	28.92	28.96	28.99	28.98	28.89
25	28.75	28.70	28.69	28.72	28.73	28.79	28.79	28.91	28.96	28.99	28.97	28.90
26	28.73	28.71	28.70	28.72	28.74	28.79	28.79	28.91	28.96	28.99	28.98	28.90
27	28.70	28.72	28.70	28.73	28.74	28.79	28.79	28.90	29.03	28.99	28.95	28.91
28	28.79	28.71	28.70	28.73	28.74	28.79	28.79	28.90	28.98	29.00	28.94	28.91
29	28.81		28.71	28.73	28.74	28.81	28.85	28.91	28.96	29.00	28.97	28.91
30	28.71		28.70	28.73	28.74	28.82	28.96	28.98	28.97	29.00	28.95	28.90
31	28.71		28.72		28.74		28.84	28.94		29.00		28.89
Avg.	28.72	28.71	28.71	28.72	28.73	28.77	28.80	28.99	28.97	29.00	28.99	28.94

09-5330.00 TWENTY-ONE MILE WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir on wasteway from West Main Canal to Colorado River. Located on east side of levee at site used prior to May 1, 1971. The site used May 1, 1971 to September 20, 1977 was located 61 metres downstream from present site on west side of levee. This wasteway is located in Arizona, 29.8 kilometres downstream from the northerly international boundary, 28.0 kilometres downstream from Morelos Diversion Dam, and 3.5 kilometres upstream from the southerly international boundary. It is the farthest downstream of the two wasteways discharging waste water from the Valley Division of the Yuma Project in the United States into the limnrophe section of the Colorado River. The elevation of the zero of the gage at the new location has not been determined.

RECORDS: Flow is computed from head on the weir measured by the water-stage recorder and weir rating determined by current meter measurements. Station operated by the United States Section of the Commission. Records available: Daily discharge, January 1951 through 1990, obtained by the United States Section; monthly discharge, March 1939 through 1950, by Bureau of Reclamation.

REMARKS: This wasteway was completed and flow began March 14, 1939. Since May 13, 1944, waste water from the West Main Canal which previously discharged across the southerly land boundary has been returned to the Colorado River through this wasteway. The West Main Canal Wasteway was completed in February of 1971, and the waste water from the West Main Canal is normally discharged across the southerly land boundary.

EXTREMES: Prior to January 1951, maximum monthly discharge 3,528,000 m³ in January 1946; minimum monthly discharge, 150,000 m³ in September 1950. Since January 1, 1951, maximum instantaneous discharge, 2.89 m³/sec on January 24, 1954, at a maximum gage height of 29.10 metres (old datum); minimum instantaneous discharge, zero during a part of most months.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	.10	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0
17	.04	0	0	0	0	0	0	0	0	0	0	0
18	.13	0	.08	0	0	0	0	0	0	0	0	0
19	.13	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0.30	0	0.08	0	0	0	0	0	0	0.10	0	0

Current Year 1990

Period 1939-1990

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	0.18	0	19	0.19	1	0	0.01	25.9	739	3,528	0
Feb.	0	0	1	0	1	0	0	0	634	3,096	0
Mar.	.38	0	18	.64	1	0	6.9	6.9	577	2,048	0
April	0	0	1	0	1	0	0	0	618	2,393	0
May	0	0	1	0	1	0	0	0	747	3,047	0
June	0	0	1	0	1	0	0	0	658	2,899	0
July	0	0	1	0	1	0	0	0	571	2,405	0
Aug.	0	0	1	0	1	0	0	0	596	3,121	0
Sept.	0	0	1	0	1	0	0	0	530	2,689	0
Oct.	.61	0	10	1.39	1	0	0	8.6	660	2,590	0
Nov.	0	0	1	0	1	0	0	0	790	2,936	0
Dec.	0	0	1	0	1	0	0	0	840	3,306	0
Yearly	0.61	0		1.39		0	0	41.4	7,960	30,060	0

! And other days

09-5345.00 EAST MAIN CANAL WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir located about 91 metres north of the international boundary near San Luis, Arizona and 2.4 kilometres east of the Colorado River. From September 28, 1977 to April 6, 1978, recorder was moved west 31 metres to a temporary bypass channel. On April 7, 1978 recorder was moved back to original site.

RECORDS: Wasteway discharges computed by United States Section of the Commission beginning November 1, 1953, from head on control weir as measured by water-stage recorder and weir ratings as determined by current meter measurements. Records available: October 1946 through 1990. Records of monthly discharges also are available for the periods January 1924 through June 1928, January 1932 through 1933, and April 1935 through September 1946.

REMARKS: Wasteway discharges from the East Main Canal comprise regulatory waste and drainage waters from the eastern half of the Valley Division of the Yuma Project and are considered as part of the volumes arriving at the limitrophe section of the Colorado River.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.07	0.05	0.08	0	0.40	0.15	0.17	0.50	0.21	0.21	0.19	0.33
2	.14	.24	.25	.20	.30	.09	.21	.53	.12	.11	.08	.43
3	.23	.24	.08	.06	.30	.08	.04	.37	.22	.03	.01	.29
4	.45	.08	.40	.05	.25	.08	.16	.16	.16	0	.27	.01
5	.19	.15	.14	.05	.08	.02	.30	.42	.21	0	.05	.05
6	.09	.09	.02	.01	.01	0	.36	.07	.16	0	.23	.30
7	.02	.03	.01	0	.12	0	.47	.29	.02	.02	.04	.05
8	.11	.07	.02	0	.02	.02	.13	.14	0	.13	.02	0
9	.24	.20	.11	0	0	.04	.04	.25	0	.03	.35	.05
10	.22	.06	.12	.10	0	.11	.07	.20	0	.05	.03	.10
11	.01	.61	.25	0	.08	.20	.16	.05	.05	.39	.41	.31
12	0	.12	.03	0	0	.08	.17	.21	.06	.22	.40	.22
13	0	.03	.01	0	.10	.01	.10	.17	.03	.09	.33	.06
14	.15	.01	.01	.07	.28	.05	.04	.29	.01	.07	.23	.27
15	.01	0	.14	.07	.31	.23	.27	.07	.13	.20	.22	.47
16	0	.07	.03	.32	.04	.15	.59	.18	.12	.06	.43	.55
17	.03	.02	0	.03	.02	.12	.21	.29	.12	0	.07	.88
18	.29	.21	.57	.01	.03	.05	.38	.31	.03	.29	.48	.51
19	.30	.28	.09	0	.08	.10	.15	.15	.09	.29	.71	.59
20	.16	.24	.01	.17	.04	.12	.21	.22	.04	.12	.68	.59
21	.43	.13	0	.02	.25	.03	.16	.04	.17	.03	.25	.53
22	.05	.08	0	.04	.70	.12	.10	.05	.03	.17	.18	.29
23	.13	.15	.10	0	.27	.01	.05	.03	.17	.07	.46	.22
24	.25	.03	.01	0	.22	.06	.01	.01	.39	.37	.30	.02
25	.10	.01	0	.02	.05	.04	.02	.01	.55	.13	.24	.01
26	.22	.14	.04	.10	.01	.12	.02	.11	.36	.32	.26	.03
27	.14	.02	0	.22	.12	.23	.03	.21	.24	.49	.35	.17
28	.04	.11	.04	.15	.25	.12	.09	.27	.15	.53	.04	.04
29	.04		.06	.12	.24	.01	.03	.21	.10	0	.33	.01
30	.03		.03	.12	.55	.02	.03	.29	.32	.04	.56	.41
31	.10		0	.53			.46	.30		.04		.37
Sum	4.24	3.47	2.65	1.93	5.65	2.46	5.23	6.40	4.26	4.50	8.20	8.16
Current Year 1990									Period 1935-1990			
Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres				
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum	
Jan.	0.37	0	4	1.42	1 8	0	0.14	366	1,164	4,144	111	
Feb.	.31	0	11	1.05	1 14	0	.12	300	976	3,910	164	
Mar.	.30	0	15	.94	1 1	0	.09	229	1,116	3,602	175	
April	.37	0	15	1.38	1 1	0	.06	167	1,092	3,910	165	
May	.33	0	7	1.16	1 7	0	.18	488	1,222	3,750	281	
June	.25	0	27	.69	1 6	0	.08	213	1,031	4,515	157	
July	.34	0	15	1.24	1 10	0	.17	452	1,105	4,428	210	
Aug.	.34	0	20	1.20	1 22	0	.21	553	1,139	4,885	196	
Sept.	.36	0	5	1.34	1 19	0	.14	368	1,088	3,910	196	
Oct.	.37	0	18	1.42	1 4	0	.25	389	1,136	4,404	379	
Nov.	.37	0	18	1.38	1 3	0	.27	708	1,235	4,404	297	
Dec.	.34	0	22	1.22	1 4	0	.26	705	1,194	3,799	305	
Yearly	0.37	0		1.42		0	0.16	4,938	13,498	47,255	3,733	

! And other days

09-5340.00 YUMA MAIN DRAIN (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorders located in the forebay and afterbay, with flow meters in the four discharge pipes at the Boundary Pumping Plant on the Main Drain about 61 metres north of the international boundary near San Luis, Arizona, 2.1 kilometres east of the Colorado River.

RECORDS: Main Drain discharges are lifted 3.05 to 3.66 metres at the pumping plant. Prior to April 1, 1969, discharges were computed from pump ratings and the differential head measured by the two gages. Beginning April 1, 1969 discharges were computed from flow meter charts. Pump ratings and flow meter discharges are checked by current meter measurements. Records obtained and computed by the United States Section of the Commission. Records available: Monthly discharges, June 1919 through 1951; daily discharges January 1952 through 1990.

REMARKS: Flows in the Main Drain are principally drainage waters from the Valley Division of the Yuma Project. The Main Drain, the East Main Canal Wasteway, West Main Canal Wasteway, and 242 Lateral discharge into Mexico at the international land boundary near San Luis, Sonora. The water is used for irrigation in Mexico on the left (Sonora) bank of the Colorado River and is considered as part of the volumes arriving at the Limitrophe section of the river.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.97	2.63	3.31	3.62	3.51	3.82	3.48	3.48	3.14	3.91	4.73	4.50
2	3.12	3.23	3.09	3.62	3.60	3.62	3.60	3.29	3.20	3.96	4.90	4.08
3	3.00	3.14	3.23	3.43	3.60	3.71	3.29	2.95	3.23	3.60	4.64	4.11
4	3.37	3.00	3.14	3.29	3.48	3.79	3.20	3.12	3.14	3.77	4.67	4.33
5	3.09	3.17	3.09	3.60	3.60	3.54	3.34	3.23	3.26	4.02	4.84	3.91
6	3.29	2.83	3.03	3.34	3.48	3.60	3.34	3.14	3.43	4.73	4.76	3.99
7	3.12	2.86	2.89	3.43	3.77	3.37	3.34	3.31	3.17	4.36	4.53	4.16
8	3.17	2.36	3.20	3.85	3.57	3.57	3.14	3.17	3.46	4.56	4.70	3.88
9	3.62	2.09	3.06	3.68	3.40	3.46	3.23	2.97	3.20	3.88	4.84	4.05
10	3.51	3.60	3.06	3.48	3.34	3.51	3.06	2.77	3.17	3.85	4.70	3.79
11	2.95	3.74	3.06	3.37	3.43	3.48	2.95	2.97	3.17	4.30	4.47	3.79
12	3.20	3.54	3.14	3.34	3.57	3.62	3.43	3.06	3.00	4.45	4.79	3.82
13	3.43	3.06	3.43	3.03	3.62	3.57	3.20	2.86	3.12	4.28	4.76	3.77
14	3.23	2.78	3.17	3.57	3.68	3.65	2.92	3.40	3.12	4.50	4.98	3.91
15	3.23	3.03	3.06	3.62	3.74	3.31	3.06	3.09	3.23	4.73	4.67	4.13
16	3.43	2.92	3.37	3.48	3.74	3.46	2.97	3.23	3.99	4.79	4.90	4.36
17	3.03	3.17	3.43	3.68	3.60	3.46	3.12	3.37	3.09	4.59	5.01	3.71
18	3.20	3.31	3.88	3.14	3.88	3.48	3.17	3.23	3.03	5.18	4.90	4.05
19	3.51	3.03	3.74	3.37	3.85	3.40	3.26	3.31	3.57	5.13	4.59	3.99
20	3.57	3.26	3.14	3.71	3.91	3.29	3.09	3.12	3.23	4.79	4.50	3.71
21	2.74	3.14	3.31	3.40	3.94	3.29	3.14	3.20	3.20	4.53	4.70	4.22
22	2.95	3.03	3.23	3.65	4.19	3.37	3.09	3.06	3.23	4.98	4.64	3.79
23	3.37	3.06	3.26	3.79	4.30	3.40	3.00	2.67	3.31	4.90	4.13	3.57
24	3.46	3.14	3.23	4.33	4.22	3.54	3.06	3.31	3.14	4.90	4.16	3.82
25	3.23	3.12	3.26	3.91	3.65	3.40	3.03	3.43	2.95	4.96	4.22	3.60
26	3.34	3.09	3.23	3.85	3.62	3.31	3.17	3.17	3.17	4.93	4.30	3.40
27	3.37	3.26	3.40	3.51	4.08	3.20	3.34	3.03	3.60	4.87	4.36	3.51
28	3.31	3.12	3.09	3.68	3.65	3.20	3.20	3.31	3.17	4.67	4.42	3.88
29	3.14		3.14	3.77	3.85	3.57	3.40	3.12	3.40	4.53	4.19	3.88
30	3.12		3.37	3.91	3.82	3.62	3.48	3.03	3.65	4.73	3.82	3.77
31	3.23		3.62		3.77		3.43	3.12		4.62		3.65

Sum	100.30	86.71	100.66	107.45	115.46	104.61	99.53	97.52	97.77	140.00	137.82	121.13
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Current Year 1990

Period 1935-1990

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	0	0	9	3.62	21	2.74	3.24	8,666	9,384	13,819	2,146
Feb.	0	0	11	3.74	8	2.36	3.10	7,492	9,131	14,787	2,023
Mar.	0	0	18	3.88	7	2.89	3.25	8,697	10,480	15,332	2,393
April	0	0	24	4.33	13	3.03	3.58	9,284	10,341	14,666	2,368
May	0	0	23	4.30	10	3.34	3.72	9,976	10,564	16,208	2,405
June	0	0	1	3.82	127	3.20	3.49	9,038	9,800	14,851	2,825
July	0	0	2	3.60	14	2.92	3.21	8,599	9,744	14,715	3,121
Aug.	0	0	1	3.48	23	2.67	3.15	8,426	9,728	14,752	3,158
Sept.	0	0	16	3.99	25	2.95	3.26	8,447	9,752	14,269	2,812
Oct.	0	0	18	5.18	3	3.60	4.52	12,096	11,030	15,277	3,626
Nov.	0	0	17	5.01	30	3.82	4.59	11,908	10,511	14,814	3,454
Dec.	0	0	1	4.50	26	3.40	3.91	10,466	10,003	14,160	3,022
Yearly	0	0		5.18		2.36	3.59	113,095	120,468	171,922	33,353

Mean daily

! And other days

09-5343.00 WEST MAIN CANAL WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder located about 0.5 kilometre upstream from outlet to Yuma Main Drain, which is 53 metres upstream from East Main Canal Wasteway outlet and 0.6 kilometre west of San Luis, Arizona. Prior to August 1, 1975, the recorder was located about 46 metres upstream from outlet to Yuma Main Drain.

RECORDS: Wasteway discharges computed by United States Section of the Commission beginning February 23, 1971, from water-stage recorder and ratings as determined by current meter measurements. Records available: February 23, 1971 through 1990.

REMARKS: Wasteway discharges from West Main Canal Wasteway comprise regulatory waste from the West Main Canal.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.22	0.02	0.04	0.78	0.13	0.15	0.32	0.01	0.29	0.17	0.29	0.16
2	.15	.13	.11	.65	.16	.16	.26	0	.20	.11	.22	.34
3	.08	.45	.07	.07	.61	.30	.13	.03	.29	.21	.18	.37
4	.16	.31	.22	0	.47	.25	.17	.18	.01	.25	.44	.03
5	.16	.29	.34	.18	.10	.23	.35	.07	.08	.21	.59	.02
6	.37	.20	.10	.30	.12	.07	.07	.29	.04	.01	.10	.05
7	.21	.17	.04	.38	.15	.16	.14	.16	.01	.21	.02	.19
8	.16	.08	.08	.45	.02	.38	.10	.38	.06	.07	.07	.21
9	.10	.20	.07	.32	.01	.22	.19	.70	.16	.01	.21	.04
10	.24	.27	.20	.28	.14	.20	.47	.69	.17	.40	.20	.21
11	.33	.20	.12	.39	.21	.35	.37	.61	.02	.16	.12	.17
12	.31	.02	.39	.23	.33	.36	.08	.56	.44	.24	.10	0
13	.18	.02	.24	.17	.14	.25	.38	.40	.25	.39	.06	.17
14	.55	.14	.05	.48	.42	.51	.30	.51	.47	.07	.27	.31
15	.40	.20	.15	.08	.41	.22	.49	.45	.56	.20	.28	.16
16	.10	.16	.17	.19	.52	.28	.43	.47	.43	.04	.22	.54
17	.25	.33	.08	.08	.45	.26	.16	.45	.31	.11	.23	.29
18	.25	.42	.14	.33	.27	.40	.14	.19	.19	.05	.16	.59
19	.22	.26	.41	.08	.13	.56	.14	.39	0	.15	.31	.37
20	.10	.27	.34	.03	.13	.43	.45	.43	.23	.02	.33	.31
21	.18	.14	.18	.28	.28	.16	.41	.29	.36	.19	.07	.48
22	.31	.15	.26	.32	.15	.23	.14	.40	.22	.42	.14	.38
23	.22	.22	.28	.59	.06	.15	.10	.49	.23	.18	.38	.51
24	.13	.19	.36	.56	.32	.47	.11	.16	.45	.16	.32	.33
25	.25	.16	.24	.32	.20	.57	.16	.52	.35	.05	.06	.46
26	.39	.14	.19	.13	.15	.06	.03	.45	.33	.13	.04	.41
27	.25	.05	.34	.15	.25	.06	.02	.43	.08	.28	.08	.25
28	.36	.04	.13	.06	.39	.19	.05	.52	.59	.42	.19	.11
29	.61		.02	.05	.42	.13	.83	.09	.29	.16	.31	.11
30	.16		.02	.20	.30	.33	.71	.21	.05	.21	.04	.08
31	.03		.20		.13		.05	.24		.26		.40
Sum	7.43	5.23	5.58	8.13	7.57	8.09	7.75	10.77	7.16	5.54	6.03	8.05
Current Year 1990										Period 1971-1990		
Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres				
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum	
Jan.	0.63	0.01	17	1.22	116	0	0.24	642	467	1,005	48.7	
Feb.	.57	0	3	1.00	11	0	.19	452	518	840	196	
Mar.	.60	0	31	1.09	11	0	.18	482	551	1,158	250	
April	.69	0	1	1.34	13	0	.27	702	438	819	202	
May	.60	0	17	1.10	11	0	.24	654	400	654	183	
June	.52	0	25	.90	11	0	.27	699	385	699	55.8	
July	.62	0	29	1.14	112	0	.25	670	379	686	77.3	
Aug.	.61	0	9	1.12	12	0	.35	931	435	950	121	
Sept.	.55	.01	24	.99	11	0	.24	619	475	947	234	
Oct.	.63	0	10	.96	19	0	.18	479	447	898	164	
Nov.	.65	0	2	1.01	12	0	.20	521	434	845	32.3	
Dec.	.63	0	23	.97	17	0	.26	696	513	1,204	43.5	
Yearly	0.69	0		1.34		0	0.24	7,547	5,442	7,683	3,179	

! And other days

WESTERN BOUNDARY WATER BULLETIN - 1990 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

09-5345.50 242 WELL FIELD NEAR SAN LUIS, ARIZONA

DESCRIPTION: Water-stage recorder and 3.7-metre Parshall flume located 31 metres upstream from confluence of East Main Canal Wasteway, 34 metres north of the southerly land boundary, and 2.3 kilometres east of the Colorado River.

RECORDS: Based on current meter measurements and a continuous record of gage heights. The station is operated by the United States Section of the Commission. Records available: October 18, 1978 through 1990.

REMARKS: Records show the pumping of ground water from the 242 well field east of San Luis, Arizona.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.65	0.32	1.84	0.84	1.78	1.01	1.63	1.58	0.26	1.46	0.65	0.65
2	1.27	.37	1.82	1.18	1.75	.89	1.58	1.57	.20	1.08	.71	.70
3	.73	.25	1.67	1.83	1.67	.87	1.64	1.69	.21	.24	.75	.74
4	.98	.39	1.13	1.78	1.70	1.01	1.70	1.61	.27	.35	.32	.71
5	1.53	.38	1.14	1.63	1.43	1.04	1.70	1.61	.22	1.10	0	.72
6	1.57	.42	1.85	1.71	1.08	1.05	1.70	1.60	.22	1.57	0	.75
7	1.63	.42	1.85	1.64	1.29	1.16	1.72	1.56	.77	1.56	0	.75
8	1.58	1.18	1.83	1.65	1.66	1.35	1.65	1.53	1.65	1.56	0	.75
9	1.53	1.60	1.83	1.65	1.65	1.25	1.62	1.24	1.50	1.56	.36	.75
10	1.50	1.51	1.73	1.63	1.68	1.19	1.70	1.51	1.50	1.56	.71	.73
11	1.50	2.01	1.79	1.63	1.75	1.21	1.73	1.39	.83	1.55	.69	.73
12	1.58	1.90	1.78	1.67	1.71	1.20	1.60	.89	.15	1.56	.68	.74
13	1.53	1.14	1.92	1.69	1.65	1.44	.15	.19	.94	1.56	.66	.74
14	1.49	1.09	2.06	1.81	1.61	1.59	0	.42	1.74	1.56	.68	1.11
15	1.33	1.17	1.96	1.47	1.70	1.74	0	.29	.88	1.56	.70	1.35
16	1.47	1.70	2.03	1.03	1.63	1.67	0	.25	.16	1.56	.74	1.35
17	1.57	2.22	1.73	1.53	1.63	1.47	.11	.35	.20	1.50	.73	1.35
18	1.58	2.22	1.11	1.81	1.77	1.36	.21	.33	.15	1.11	.31	1.37
19	1.58	2.21	1.44	1.82	1.69	1.37	.97	.31	.16	.68	0	1.38
20	1.59	2.22	1.85	1.82	1.64	1.47	1.67	.21	.14	.65	0	1.38
21	1.01	1.99	1.88	1.83	1.70	1.55	1.64	.21	.23	.64	.20	1.39
22	.33	1.89	1.82	1.83	1.25	1.70	1.60	.92	.28	.58	.73	1.40
23	.39	1.91	1.89	1.78	.89	1.72	1.61	1.61	.22	.60	.74	1.41
24	.38	1.80	1.84	1.76	1.42	1.59	1.57	1.72	0	.59	.75	1.41
25	.37	1.87	1.91	1.80	1.71	1.60	1.61	1.67	.59	.61	.56	1.43
26	.37	1.88	1.85	1.79	1.70	1.61	1.63	1.61	1.19	.67	.44	1.44
27	.40	1.87	1.79	1.57	1.72	1.56	1.70	1.57	1.20	.65	.69	.66
28	.40	1.79	1.86	1.23	1.71	1.57	1.63	1.58	1.38	.58	.66	.73
29	.36		1.83	1.22	1.72	1.70	1.58	1.66	1.48	.55	.64	1.46
30	.32		1.91	1.45	1.31	1.64	1.61	.81	1.36	.55	.61	1.46
31	.29		1.66		.89		1.56	.09		.58		1.44
Sum	33.81	39.72	54.60	48.08	48.49	41.58	40.82	33.58	20.08	31.93	14.71	32.98
Current Year 1990												
Period 1970-1990												
Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres				
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum	
Jan.	0.35	0.08	1	1.65	22	0.18	1.09	2,921	819	3,406	0	
Feb.	.47	.07	12	2.62	3	.14	1.42	3,432	1,034	3,677	0	
Mar.	.41	.20	14	2.16	4	.71	1.76	4,717	1,034	4,717	0	
April	.39	.21	3	1.97	1	.78	1.60	4,154	1,096	4,154	0	
May	.40	.22	12	2.07	122	.80	1.56	4,190	1,445	4,269	13.9	
June	.37	.22	115	1.79	1	.82	1.39	3,593	1,343	4,024	26.4	
July	.38	0	20	1.90	113	0	1.32	3,527	1,320	3,725	20.1	
Aug.	.43	0	10	2.31	113	0	1.08	2,901	1,126	3,547	0	
Sept.	.36	0	14	1.76	124	0	.67	1,735	1,059	2,869	0	
Oct.	.34	.07	1	1.61	3	.14	1.03	2,759	890	3,344	0	
Nov.	.21	0	116	.76	1	0	.49	1,271	355	1,271	0	
Dec.	.32	.01	28	1.48	128	0	1.06	2,849	921	3,654	0	
Yearly	0.47	0		2.62		0	1.21	38,049	12,511	38,049	201	

! And other days

09-5348.00 TOTAL FLOWS CROSSING INTERNATIONAL BOUNDARY
INTO MEXICO NEAR SAN LUIS, SONORA

DESCRIPTION: The tabulated data below are the combined flows of the East Main Canal Wasteway, West Main Canal Wasteway, 242 Lateral, and the Yuma Main Drain and represent the total water crossing the international land boundary into the Sanchez Mejerada Canal near San Luis, Arizona. The mean daily discharges are combined and rounded and the monthly volumes are obtained by adding the volumes of the four stations.

RECORDS: Records obtained and computed by the United States Section of the Commission. Records available: February 23, 1971 through 1990; 242 Lateral from November 1978 through 1990.

REMARKS: Descriptions and flows of the individual stations, East Main Canal Wasteway, West Main Canal Wasteway, the Yuma Main Drain, and 242 Lateral are published separately on preceding pages of this bulletin.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.92	3.02	5.27	5.24	5.82	5.13	5.61	5.57	3.91	5.74	5.87	5.64
2	4.68	3.96	5.27	5.66	5.81	4.77	5.65	5.38	3.71	5.26	5.91	5.55
3	4.04	4.08	5.05	5.39	6.18	4.96	5.10	5.03	3.94	4.08	5.58	5.51
4	4.96	3.79	4.89	5.12	5.90	5.13	5.24	5.07	3.58	4.36	5.70	5.09
5	4.96	4.00	4.70	5.45	5.20	4.83	5.69	5.33	3.76	5.32	5.49	4.70
6	5.32	3.54	5.00	5.35	4.69	4.72	5.48	5.10	3.84	6.31	5.08	5.09
7	4.97	3.48	4.79	5.45	5.32	4.69	5.68	5.33	3.97	6.15	4.59	5.15
8	5.03	3.70	5.12	5.95	5.27	5.31	5.01	5.23	5.17	6.32	4.80	4.84
9	5.50	5.08	5.07	5.65	5.06	4.96	5.07	5.17	4.86	5.48	5.76	4.89
10	5.48	5.43	5.11	5.49	5.16	5.02	5.30	5.16	4.85	5.87	5.63	4.84
11	4.79	6.56	5.22	5.39	5.47	5.24	5.21	5.03	4.06	6.41	5.69	5.00
12	5.09	5.58	5.34	5.24	5.61	5.26	5.27	4.72	3.66	6.47	5.97	4.79
13	5.14	4.25	5.60	4.89	5.51	5.26	3.82	3.62	4.33	6.32	5.80	4.73
14	5.41	4.01	5.30	5.92	5.99	5.81	3.26	4.63	5.33	6.20	6.17	5.60
15	4.96	4.40	5.30	5.24	6.17	5.50	3.81	3.90	4.79	6.70	5.87	6.12
16	5.00	4.85	5.60	5.21	5.93	5.56	3.99	4.12	4.70	6.45	6.29	6.79
17	4.87	5.73	5.24	5.12	5.70	5.30	3.60	4.46	3.72	6.20	6.05	6.22
18	5.32	6.17	5.70	5.29	5.94	5.29	3.90	4.06	3.40	6.63	5.85	6.51
19	5.61	5.78	5.67	5.28	5.75	5.44	4.52	4.17	3.82	6.24	5.60	6.33
20	5.41	5.98	5.34	5.73	5.72	5.30	5.43	3.97	3.63	5.58	5.51	6.00
21	4.35	5.40	5.38	5.53	6.17	5.01	5.36	3.74	3.96	5.39	5.23	6.62
22	3.63	5.15	5.31	5.84	6.28	5.41	4.93	4.43	3.76	6.15	5.70	5.87
23	4.11	5.33	5.53	6.17	5.54	5.27	4.76	4.80	3.93	5.75	5.72	5.71
24	4.22	5.16	5.44	6.66	6.18	5.66	4.75	5.20	3.98	6.02	5.53	5.58
25	3.94	5.16	5.41	6.04	5.62	5.60	4.81	5.61	4.43	5.75	5.07	5.49
26	4.32	5.25	5.30	5.88	5.49	5.11	4.85	5.34	5.05	6.05	5.05	5.28
27	4.15	5.19	5.53	5.45	4.17	5.04	5.09	5.24	5.11	6.29	5.48	4.59
28	4.11	5.05	5.12	5.11	6.00	5.07	4.97	5.68	5.29	6.20	5.30	4.76
29	4.15		5.05	5.15	6.24	5.41	5.83	5.08	5.27	5.24	5.46	5.45
30	3.63		5.33	5.68	5.98	5.62	5.84	4.34	5.38	5.53	5.03	5.71
31	3.65		5.49		5.32		5.50	3.74		5.49		5.87
Sum	145.72	135.08	163.47	165.57	177.19	156.68	153.33	148.25	129.19	181.95	166.78	170.32

Current Year 1990

Period 1935-1990

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	High	Low	φ High		φ Low			Total	Average	Maximum	Minimum
			Day		Day						
Jan.			19	5.61	122	3.63	4.70	12,590	10,058	14,963	2,619
Feb.			11	6.56	1	3.02	4.82	11,671	9,931	15,998	2,864
Mar.			18	5.70	5	4.70	5.27	14,124	11,266	16,904	2,864
April			24	6.66	13	4.89	5.52	14,305	11,010	16,013	2,611
May			22	6.28	6	4.69	5.72	15,309	11,632	17,145	3,050
June			14	5.81	7	4.69	5.22	13,537	10,704	15,505	3,115
July			30	5.84	14	3.26	4.95	13,248	10,704	15,320	3,610
Aug.			28	5.68	13	3.62	4.78	12,809	10,586	15,612	3,687
Sept.			30	5.38	18	3.40	4.31	11,162	10,528	15,357	3,210
Oct.			15	6.70	3	4.08	5.87	15,720	11,415	17,143	4,248
Nov.			16	6.29	7	4.59	5.56	14,410	10,545	15,680	4,202
Dec.			16	6.79	27	4.59	5.49	14,716	10,738	14,863	3,562
Yearly				6.79		3.02	5.19	163,601	129,117	183,801	39,274

φ Mean daily

! And other days

WESTERN BOUNDARY WATER BULLETIN - 1990 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

09-5222.00 COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY - DISCHARGES

DESCRIPTION: Water-stage recorder was located in Mexico on the right bank of the river about 305 metres upstream from the southerly international boundary, 3.2 kilometres west of San Luis, Arizona, and 35 kilometres downstream from Morelos Dam. The zero of the gage was at mean sea level, U. S. C. & G. S. datum. This gage was destroyed on January 19, 1983. Between January 19, 1983 and December 10, 1985, temporary gages were installed on the United States side and levels were established to ensure continuous record. On December 10, 1985 a permanent water-stage recorder was relocated on the left bank of the river about 24 metres upstream from the southerly international boundary.

RECORDS: Records obtained and furnished by the United States Section of the Commission. Computations by shifting control methods. Records available: Daily discharges, January 1950 through 1990; continuous record of gage heights, January 1947 through 1990. Monthly flows for this station have been derived for the period January 1935 through 1949 based on the computed records of monthly flows of the Colorado River at the northerly international boundary combined with the measured monthly flows from the wasteways discharging into the boundary section of the river from the Yuma Project in Arizona.

REMARKS: Reservoirs, diversions in the United States and Mexico, drainage returns, and waste flows modify the river flow at this station.

EXTREMES: Since January 1950: Maximum instantaneous discharge, 937 m³/sec on August 19, 1983; maximum gage height, 25.86 metres on November 29, 1957. Minimum discharge, no flow on several occasions since September 1, 1956.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	.19	0	0	0
6	0	0	0	0	0	0	0	0	5.04	0	0	0
7	0	0	0	0	0	0	0	0	2.50	0	0	0
8	0	0	0	0	0	0	0	0	.15	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	1.72	0	0	0	0
17	0	0	0	0	0	0	0	3.94	0	0	0	0
18	0	0	0	0	0	0	0	.07	0	0	0	0
19	0	0	0	0	0	0	0	.44	0	0	0	0
20	0	0	0	0	0	0	0	2.13	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	8.30	7.88	0	0	0

Current Year 1990

Period 1935-1990

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	High	Low	Day	High		Low		Total	Average	Maximum	Minimum
				Day							
Jan.	21.63	21.63	11	0	11	0	0	0	457,762	2,062,379	0
Feb.	21.63	21.63	11	0	11	0	0	0	368,693	1,708,370	0
Mar.	21.63	21.63	11	0	11	0	0	0	295,006	1,390,132	0
April	21.63	21.63	11	0	11	0	0	0	195,708	935,227	0
May	21.63	21.63	11	0	11	0	0	0	276,623	1,430,837	0
June	21.63	21.63	11	0	11	0	0	0	241,665	1,455,506	0
July	21.63	21.63	11	0	11	0	0	0	209,901	1,821,962	0
Aug.	22.04	21.56	116	8.47	11	0	.27	717	255,910	2,103,318	0
Sept.	21.96	21.50	6	6.97	11	0	.26	681	252,138	1,956,768	0
Oct.	21.50	21.50	11	0	11	0	0	0	299,425	2,144,909	0
Nov.	21.50	21.50	11	0	11	0	0	0	347,848	2,268,409	0
Dec.	21.50	21.50	11	0	11	0	0	0	426,187	2,268,370	0
Yearly	22.04	21.50		8.47		0	0.04	1,398	3,596,866	15,656,495	1,398

! And other days

09-5222.01 COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY - STAGES

(See Preceding Page for Description)

MEAN DAILY GAGE HEIGHT IN METRES 1990

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.56	21.50	21.50	21.50
2	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.56	21.50	21.50	21.50
3	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.56	21.50	21.50	21.50
4	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.56	21.50	21.50	21.50
5	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.59	21.50	21.50	21.50
6	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.90	21.50	21.50	21.50
7	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.79	21.50	21.50	21.50
8	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.54	21.50	21.50	21.50
9	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.50	21.50	21.50	21.50
10	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.50	21.50	21.50	21.50
11	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.50	21.50	21.50	21.50
12	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.50	21.50	21.50	21.50
13	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.50	21.50	21.50	21.50
14	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.50	21.50	21.50	21.50
15	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.50	21.50	21.50	21.50
16	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.73	21.50	21.50	21.50	21.50
17	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.87	21.50	21.50	21.50	21.50
18	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.58	21.50	21.50	21.50	21.50
19	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.62	21.50	21.50	21.50	21.50
20	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.75	21.50	21.50	21.50	21.50
21	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.56	21.50	21.50	21.50	21.50
22	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.56	21.50	21.50	21.50	21.50
23	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.56	21.50	21.50	21.50	21.50
24	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.56	21.50	21.50	21.50	21.50
25	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.56	21.50	21.50	21.50	21.50
26	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.56	21.50	21.50	21.50	21.50
27	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.56	21.50	21.50	21.50	21.50
28	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.56	21.50	21.50	21.50	21.50
29	21.63		21.63	21.63	21.63	21.63	21.63	21.56	21.50	21.50	21.50	21.50
30	21.63		21.63	21.63	21.63	21.63	21.63	21.56	21.50	21.50	21.50	21.50
31	21.63		21.63		21.63		21.63	21.56		21.50		21.50
Avg.	21.63	21.63	21.63	21.63	21.63	21.63	21.63	21.62	21.54	21.50	21.50	21.50

WESTERN BOUNDARY WATER BULLETIN - 1990 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

09-5333.00 WELLTON-MOHAWK BYPASS DRAIN AT SOUTHERLY INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder and Parshall flume located 24 metres upstream from the southerly land boundary, 168 metres east of the Colorado River, and 2.9 kilometres west of San Luis, Arizona. The zero of the gage has not been determined.

RECORDS: Based on current meter measurements and a continuous record of gage heights. Station is operated by United States Section of the Commission. Records available: June 23, 1977 through 1990.

REMARKS: Pursuant to Minute No. 242 of the Commission, a bypass drain of the Wellton-Mohawk extension channel was constructed from Morelos Dam to the Santa Clara Slough in Mexico along the left bank of the Colorado River.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.86	6.32	5.64	5.52	5.38	3.82	4.45	4.62	5.18	5.86	5.78	5.89
2	5.86	6.17	5.64	5.52	5.81	4.08	4.45	4.53	5.24	5.81	5.72	6.03
3	5.78	5.95	5.44	5.64	5.95	4.28	4.47	4.73	5.18	5.81	5.95	5.98
4	5.86	5.98	5.21	5.78	5.07	4.28	4.47	4.76	5.04	5.86	5.69	5.81
5	5.92	6.12	5.24	5.72	5.81	4.33	4.22	4.73	4.36	5.95	5.52	5.72
6	6.06	6.03	5.21	5.78	5.95	4.28	4.16	4.59	4.39	5.81	5.86	5.75
7	5.92	6.06	5.21	5.75	5.98	3.96	4.19	4.42	4.84	5.81	6.09	5.95
8	6.00	6.03	5.27	5.72	6.09	3.91	4.42	4.56	5.10	6.03	6.23	5.81
9	6.15	6.03	5.35	5.55	5.81	4.22	4.50	4.73	4.90	6.03	6.23	5.81
10	6.29	6.09	5.32	5.55	5.95	4.30	4.50	4.64	4.96	6.00	6.20	5.81
11	6.32	6.06	5.32	5.52	5.01	4.30	4.19	4.62	5.10	5.92	5.47	6.09
12	6.32	5.98	5.47	5.30	3.12	4.42	4.25	4.39	5.13	5.83	5.27	6.40
13	6.17	6.06	5.64	5.15	1.01	4.50	4.39	2.69	5.30	5.69	5.27	6.37
14	6.26	6.20	5.55	5.24	.66	4.45	4.05	3.60	5.24	5.81	5.27	6.06
15	6.23	6.09	5.64	5.32	.16	4.42	4.13	3.65	5.27	5.81	5.72	6.12
16	6.34	6.00	5.72	5.47	.08	4.36	4.13	3.57	5.27	5.78	5.92	6.12
17	6.32	5.95	5.69	5.49	.07	4.45	4.08	3.88	5.24	5.52	5.83	6.15
18	6.26	5.98	5.72	5.55	.07	4.36	4.08	4.13	5.27	5.78	5.81	6.09
19	6.17	5.81	5.78	5.32	.10	4.70	4.22	4.19	5.38	5.83	5.95	6.23
20	6.20	5.72	5.81	5.38	.25	4.50	4.39	4.22	5.32	5.66	5.81	6.20
21	6.17	5.69	5.66	5.55	.27	4.79	4.42	3.99	5.55	5.58	5.92	6.12
22	6.17	5.86	5.55	5.83	.27	4.62	4.42	4.22	5.41	5.41	5.86	6.09
23	6.09	5.81	5.58	6.03	1.03	4.64	4.36	4.45	5.47	5.69	5.95	6.17
24	6.20	5.75	5.58	5.92	3.94	4.62	4.36	4.53	5.52	5.83	5.92	6.09
25	6.29	5.66	5.78	5.81	5.58	4.56	4.45	4.53	5.81	5.69	5.69	6.15
26	6.29	5.66	5.64	5.81	5.58	4.53	4.45	4.73	6.17	5.35	5.61	6.23
27	6.32	5.75	5.66	5.75	5.44	4.33	4.73	4.84	6.09	5.58	5.69	6.26
28	6.29	5.58	5.69	5.55	5.32	4.25	4.81	5.13	6.03	5.55	5.66	6.15
29	6.46		5.66	5.47	4.73	4.47	4.81	5.18	5.95	5.55	5.61	5.95
30	6.34		5.61	5.24	3.88	4.47	4.84	5.15	5.69	5.81	5.69	5.81
31	6.34		5.58		3.77		4.67	5.07		5.92		5.92

Sum	191.25	166.39	171.86	167.23	108.14	131.20	136.06	137.07	159.40	178.56	173.19	187.33
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Current Year 1990

Period 1977-1990

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	0.65	0.58	29	6.94	13	5.64	6.17	16,524	15,203	21,638	7,412
Feb.	.63	.57	1	6.46	28	5.38	5.94	14,376	13,975	18,374	8,506
Mar.	.60	.55	19	5.92	6	5.04	5.54	14,849	15,592	21,496	11,420
April	.60	.54	122	6.09	30	5.07	5.57	14,449	14,565	20,613	3,445
May	.60	.04	1	6.15	18	.05	3.49	9,343	14,882	20,732	5,215
June	.54	.42	21	5.13	18	3.31	4.37	11,336	14,249	19,842	9,109
July	.54	.43	8	5.18	5	3.54	4.39	11,756	15,116	22,235	10,279
Aug.	.55	.26	127	5.32	13	1.50	4.42	11,843	15,495	22,444	10,677
Sept.	.62	.48	26	6.46	5	4.22	5.31	13,772	14,233	23,538	51.4
Oct.	.61	.53	8	6.34	26	4.98	5.76	15,428	14,947	23,600	23.9
Nov.	.62	.51	24	6.51	14	4.59	5.77	14,964	14,096	20,944	59.2
Dec.	.63	.55	12	6.71	10	5.32	6.04	16,185	14,980	22,518	7,990
Yearly	0.65	0.04		6.94		0.05	5.23	164,825	177,333	222,488	120,438

! And other days

09-5350.00 WASTEWAY TO COLORADO RIVER AT KILOMETRE 27 IN MEXICO

DESCRIPTION: Water-stage recorder and cableway located on the left bank of the canal wasteway immediately upstream from where it discharges into the Colorado River, 1.0 kilometre downstream from the wasteway gates on the Central Feeder Canal on the right bank of the Colorado River, 27 kilometres downstream from Morelos Dam, and 250 metres south of the junction of the Mexicali-San Luis and Algodones-Pescaderos highways.

RECORDS: Data obtained and computed by the Colorado River Irrigation District of the Ministry of Agriculture and Hydraulic Resources and furnished by the Mexican Section of the Commission. Records shown in table below are waste returns to the Colorado River. Records available: April 1956 through 1990.

REMARKS: The Colorado River Irrigation District transports water for irrigation of land on the left bank of the Colorado River by the Central Feeder Canal to a point called Kilometre 27. At this point, flows may be returned to the river through the wasteway or diverted to the Bacanora-Monumentos Canal system through the Sanchez Mejorada Siphon, which was placed in operation on June 28, 1963. As part of the rehabilitation works, started in 1968, of the Colorado River Irrigation District, the Canal de Conexion was enlarged and lined, and is now known as the Central Feeder Canal.

MONTHLY DISCHARGE IN THOUSAND CUBIC METRES

MONTH	CURRENT YEAR 1990	PERIOD 1956 - 1990		
		AVERAGE	MAXIMUM	MINIMUM
January	478	12,085	85,761	0
February	86.4	5,687	50,898	0
March	0	8,550	72,049	0
April	0	14,824	85,372	0
May	0	13,899	99,576	0
June	85.5	11,885	61,705	0
July	0	13,664	56,912	0
August	2,396	18,514	132,183	0
September	668	15,181	83,943	0
October	561	13,840	136,198	0
November	0	12,959	122,170	0
December	0	11,590	86,607	0
Yearly	4,275	156,394	628,347	0

09-5365.00 WASTEWAY TO COLORADO RIVER AT KILOMETRE 38 IN MEXICO

DESCRIPTION: Wasteway to the Colorado River on the left bank of new Barrote Canal at old dam and bridge at Kilometre 18+251 (old Kilometre 38+000). The wasteway is located in the Colonia Bojorquez 1.3 kilometres upstream from the Sonora-Baja California railroad bridge, 5.9 kilometres downstream from the Miguel C. Rodriguez gaging station, and 45 kilometres downstream from the southerly international boundary.

RECORDS: The records are computed by the Ministry of Agriculture and Hydraulic Resources and based upon gate openings. Records available: January 1964 through 1990.

REMARKS: The wasteway structure on the left bank of the Colorado River has two manually operated radial gates 3.0 metres wide. It discharges into a dirt canal 200 metres long with a total capacity of 13.0 m³/sec which discharges to the river.

MONTHLY DISCHARGE IN THOUSAND CUBIC METRES

MONTH	CURRENT YEAR 1990	PERIOD 1964 - 1990		
		AVERAGE	MAXIMUM	MINIMUM
January	0	2,055	10,541	0
February	0	1,621	12,035	0
March	0	846	5,932	0
April	0	451	5,555	0
May	0	1,671	14,246	0
June	0	963	8,585	0
July	0	807	9,114	0
August	0	1,310	17,765	0
September	0	2,545	16,855	0
October	0	5,225	28,669	0
November	0	3,255	25,263	0
December	0	2,697	13,380	0
Yearly	0	23,448	103,228	0

STORED WATER IN LARGE RESERVOIRS OF THE COLORADO RIVER

Data are presented below for all large storage reservoirs in the Colorado River basin below Lee's Ferry, all of which are located in the United States. The monthly figures represent usable contents on the last day of the month, in millions of cubic metres. The capacities indicated are usable capacities at the top of the spillway gates in closed position for those dams having controlled spillways; for all others, capacities indicated are at spillway level. Records furnished by the U.S. Geological Survey.

IN MILLIONS OF CUBIC METRES

Month	LAKE MEAD (Capacity 32,266.6)		LAKE MOHAVE (Capacity 2,232.6)		HAVASU LAKE (Capacity 764.0)		TOTAL IN UNITED STATES RESERVOIRS (Capacity 35,263.2)	
	1990	Average 1935-1990	1990	Average 1951-1990	1990	Average 1939-1990	1990	Estimated Average
Jan.	26,688	22,704	2,172	2,052	670.0	682.3	29,529.8	25,437.7
Feb.	26,817	22,504	2,045	2,068	666.6	684.7	29,528.8	25,257.2
Mar.	26,441	22,193	2,070	2,068	718.0	702.8	29,228.7	24,963.3
April	25,987	22,251	1,998	2,058	737.6	739.9	28,722.8	25,048.2
May	25,491	23,104	1,980	2,129	758.6	743.9	28,229.4	25,977.3
June	25,182	24,367	1,916	2,017	708.6	740.5	27,805.7	27,124.6
July	24,761	24,544	1,881	1,866	711.0	727.3	27,353.0	27,137.1
Aug.	24,652	24,314	1,943	1,808	727.9	708.6	27,322.9	26,829.7
Sept.	24,810	24,051	1,835	1,770	692.6	702.4	27,338.2	26,522.6
Oct.	24,665	23,789	1,765	1,780	678.3	700.7	27,108.1	26,269.7
Nov.	24,607	23,594	1,782	1,866	665.8	688.9	27,054.9	26,149.3
Dec.	24,502	23,376	1,971	1,968	665.5	686.8	27,138.4	26,030.7
Avg.	25,384	23,399	1,947	1,954	700.0	709.1	28,030.0	26,062.3
Max.	26,817	! 34,266	2,172	! 2,230	758.6	! 849.5	29,529.8	! 35,934.1
Min.	24,502	* 13,232	1,765	!! 1,463	665.5	!! 94.9	27,054.9	!! 16,112.5

! Maximum end of month storage for period of record

!! Minimum end of month storage for period of record

* Minimum end of month storage since 1940

CHEMICAL ANALYSES OF WATER SAMPLES
1990

The tables below are based on chemical analyses of samples from the Colorado River at the Northerly International Boundary taken by the United States Section of the Commission and analyzed under a contract with the U. S. Bureau of Reclamation.

COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY

1990	Time	Streamflow	Specific	pH	Hardness,	Hardness,	Calcium	Magnesium
Date	Standard	Momentary	Conductance		Total	Noncarbonate	ion (Ca),	ion (Mg),
		m ³ /sec	Micromhos	Units	(as CaCO ₃)	(as CaCO ₃)	Dissolved	Dissolved
					mg/L	mg/L	mg/L	mg/L
Jan. 2	0730	28.9	1,560	8.3	404.41	227.41	102.0	36.0
16	0800	39.9	1,460	8.3	375.88	197.88	94.8	33.5
Feb. 5	0830	51.5	1,330	8.3	349.44	184.44	88.0	31.2
20	0830	65.4	1,350	8.2	344.68	179.68	92.0	27.6
Mar. 5	0730	67.1	1,330	8.3	359.16	198.16	88.0	33.6
19	0800	81.0	1,320	8.3	349.39	188.39	94.0	27.6
Apr. 2	0800	82.1	1,290	8.3	398.69	240.69	88.0	43.2
16	0800	82.7	1,220	8.2	369.44	217.44	95.1	31.8
May 7	0800	40.8	1,400	8.3	378.68	213.68	94.3	34.5
14	0900	39.1	1,660	8.3	399.62	221.62	104.0	33.7
21	0800	42.5	1,460	8.2	388.43	228.43	95.2	36.3
25	0800	43.6	1,440	8.1	357.83	197.83	87.8	33.4
June 4	0900	61.5	1,320	8.3	349.19	189.19	91.9	28.8
July 2	0800	67.7	1,250	8.3	353.88	197.88	87.9	32.4
16	0800	67.4	1,210	8.4	342.20	187.20	84.4	31.7
Aug. 6	0730	57.8	1,300	8.3	342.19	185.19	84.9	31.4
20	0800	85.0	1,270	8.2	352.96	202.96	86.9	32.8
Sept. 4	0730	48.7	1,470	8.2	365.62	204.62	90.5	33.7
17	0740	37.7	1,460	8.3	365.49	195.49	91.3	33.2
Oct. 1	0800	30.0	1,540	8.3	399.01	222.01	100.0	36.0
15	0815	29.5	1,560	8.2	406.09	229.09	101.0	37.1
Nov. 5	0800	32.9	1,570	8.2	409.02	231.02	102.0	37.2
19	0830	31.4	1,590	8.3	413.61	234.61	104.0	37.1
Dec. 3	0830	36.5	1,600	8.3	407.10	225.10	101.0	37.3
17	0830	40.5	1,490	8.3	401.54	222.54	99.8	36.7

1990	Sodium	Potassium	Sulfate	Chloride	Carbonate	Bicarbonate	Nitrate	Solids
Date	ion (Na),	ion (K)	ion (SO ₄),	(Cl),	(as CO ₃)	(as HCO ₃)	(as NO ₃)	Dissolved
	Dissolved	Dissolved	Dissolved	Dissolved				(Calculated)
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		
Jan. 2	177	5.3	359	184	0.0	216	1.6	988
16	162	3.8	343	162	0.0	217	1.9	920
Feb. 5	146	4.2	311	141	0.6	200	1.2	833
20	147	4.1	316	142	0.0	201	1.6	841
Mar. 5	152	4.2	313	146	0.6	195	1.8	846
19	134	3.8	282	120	0.0	196	1.7	771
Apr. 2	132	4.3	291	134	0.0	193	2.3	802
16	127	4.1	280	119	0.0	185	1.6	761
May 7	158	4.6	305	146	0.0	201	1.6	855
14	191	4.6	377	299	0.0	217	2.4	1,060
21	174	5.1	357	164	0.0	195	1.5	942
25	160	4.9	311	161	0.0	195	1.8	869
June 4	149	4.3	316	147	0.6	194	2.0	847
July 2	137	4.4	304	131	0.0	190	1.7	804
16	128	4.5	297	126	1.7	186	2.2	779
Aug. 6	141	4.6	300	128	0.0	192	1.4	809
20	140	4.9	301	130	0.0	183	1.0	801
Sept. 4	169	4.8	329	173	0.0	196	1.9	913
17	166	4.6	346	168	0.0	207	1.9	929
Oct. 1	178	4.7	350	183	0.0	216	1.9	976
15	176	4.7	331	182	0.0	216	1.5	956
Nov. 5	196	5.0	344	198	0.0	217	1.9	1,000
19	188	4.9	358	196	0.0	218	1.8	1,010
Dec. 3	191	4.7	354	197	0.0	222	2.0	1,010
17	181	4.9	382	172	0.0	218	1.6	1,000

SPECIFIC CONDUCTANCE OF WATER SAMPLES

The following tables show specific conductance of individual water samples taken at Colorado River stations and in Mexican canals. Samples were taken at the northerly international boundary by both Sections of the Commission and at the southerly international boundary by the United States Section. Determinations for the northerly international boundary were made by the Bureau of Reclamation and the United States Section of the Commission (jointly); and for the southerly international boundary, by the United States Section of the Commission. Samples for the Intake Canal at Morelos Dam were taken by the Mexican Section of the Commission, and determinations were made by the Ministry of Agriculture and Hydraulic Resources of Mexico.

COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	* 1,550	1,460	1,320	* 1,270	1,190	1,310	* 1,240	1,250	* 1,410	1,540	1,600	* 1,650
2	1,560	* 1,370	1,350	1,290	1,240	* 1,310	1,250	1,260	* 1,470	1,530	1,610	* 1,630
3	1,580	* 1,360	* 1,340	1,270	1,290	* 1,320	1,240	1,300	* 1,520	1,520	* 1,600	1,600
4	1,450	* 1,340	* 1,340	1,280	1,300	1,320	* 1,260	* 1,300	1,470	1,410	* 1,580	1,510
5	1,410	* 1,330	1,330	1,260	* 1,330	1,340	1,270	* 1,300	1,110	1,440	1,570	1,530
6	* 1,450	1,420	1,350	1,210	* 1,370	1,350	1,250	1,300	1,160	* 1,470	1,590	1,520
7	* 1,480	1,500	1,290	* 1,200	1,400	1,320	* 1,220	1,270	* 1,290	* 1,530	1,600	1,500
8	1,520	1,350	1,270	* 1,200	1,400	1,300	* 1,230	1,260	* 1,370	1,350	1,600	* 1,500
9	1,510	1,350	1,310	1,190	1,380	* 1,300	1,220	1,270	* 1,460	1,370	1,510	* 1,510
10	1,450	* 1,350	* 1,300	1,240	1,400	* 1,290	1,180	1,280	* 1,540	1,370	* 1,530	1,510
11	1,430	* 1,340	* 1,280	1,180	1,400	1,290	1,230	* 1,270	1,450	1,590	* 1,540	1,520
12	1,460	1,340	1,270	1,180	* 1,450	1,270	1,200	* 1,260	1,320	1,530	* 1,560	1,500
13	* 1,460	1,330	1,250	1,240	* 1,650	1,300	1,220	1,250	1,430	* 1,340	1,570	1,510
14	* 1,460	1,300	1,240	* 1,230	1,660	1,310	* 1,210	1,170	1,430	* 1,350	1,570	1,520
15	* 1,460	1,300	1,240	* 1,230	1,620	1,340	* 1,210	1,050	* 1,440	1,560	1,560	* 1,530
16	1,460	1,320	1,260	1,220	1,480	* 1,330	1,210	1,090	* 1,450	1,530	1,570	* 1,550
17	1,400	* 1,320	* 1,260	1,170	1,460	* 1,320	1,210	1,250	1,460	1,550	* 1,580	1,550
18	1,450	* 1,350	* 1,270	1,350	1,470	1,300	1,220	* 1,260	1,450	1,540	* 1,580	1,520
19	1,440	* 1,340	1,270	1,170	* 1,470	1,240	1,200	* 1,260	1,450	1,520	1,590	1,510
20	* 1,440	1,350	1,240	1,190	* 1,460	1,240	1,230	1,270	1,440	* 1,530	1,600	1,480
21	* 1,440	1,330	1,240	* 1,200	1,460	1,200	* 1,240	1,300	1,480	* 1,540	1,570	1,480
22	1,440	1,290	1,220	* 1,200	1,470	1,220	* 1,250	1,300	* 1,480	1,550	* 1,600	* 1,520
23	1,490	1,340	1,240	1,210	1,430	* 1,230	1,250	1,360	* 1,480	1,590	1,640	* 1,580
24	1,420	* 1,340	* 1,240	1,170	1,470	* 1,230	1,250	1,360	1,480	1,520	* 1,590	1,620
25	1,390	* 1,330	* 1,240	1,210	1,440	1,340	1,240	* 1,340	1,460	1,570	* 1,530	* 1,600
26	1,430	1,330	1,240	1,190	* 1,430	1,200	1,210	* 1,320	1,460	1,590	1,480	1,570
27	* 1,400	1,310	1,240	1,160	* 1,390	1,220	1,210	1,300	* 1,460	* 1,590	1,650	1,570
28	* 1,360	1,290	1,210	* 1,180	1,370	1,200	* 1,220	1,310	* 1,460	* 1,590	1,650	1,490
29	1,330		1,230	* 1,190	1,340	1,220	* 1,220	1,300	* 1,460	1,590	1,680	* 1,490
30	1,640		1,240	1,210	1,340	* 1,240	1,230	1,290	* 1,500	1,600	1,660	* 1,500
31	1,370		* 1,250		1,350		1,220	1,350		1,600		1,500

* Estimated

SPECIFIC CONDUCTANCE OF WATER SAMPLES

INTAKE CANAL AT MORELOS DIVERSION STRUCTURE

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,610	1,410	1,350	1,200	1,250	1,360	1,290	1,290	1,450	1,580	1,610	1,720
2	1,590	1,400	1,350	1,290	1,270	1,350	1,290	1,310	1,450	1,530	1,610	1,540
3	1,610	1,360	1,350	1,330	1,400	1,370	1,310	1,310	1,460	1,520	1,610	1,540
4	1,500	1,400	1,400	1,340	1,400	1,370	1,330	1,320	1,230	1,550	1,620	1,530
5	1,490	1,400	1,400	1,250	1,400	1,350	1,330	1,320	1,120	1,550	1,610	1,530
6	1,490	1,400	1,380	1,260	1,410	1,340	1,310	1,320	1,180	1,550	1,630	1,530
7	1,540	1,440	1,380	1,260	1,420	1,330	1,280	1,320	1,430	1,580	1,650	1,590
8	1,530	1,390	1,310	1,250	1,380	1,350	1,270	1,300	1,450	1,600	1,580	1,530
9	1,480	1,390	1,300	1,290	1,380	1,380	1,260	1,330	1,350	1,600	1,590	1,550
10	1,480	1,390	1,300	1,290	1,500	1,390	1,290	1,340	1,370	1,590	1,580	1,560
11	1,500	1,380	1,300	1,290	1,500	1,340	1,280	1,330	1,500	1,560	1,610	1,560
12	1,500	1,350	1,300	1,310	1,530	1,330	1,270	1,320	1,380	1,580	1,510	1,510
13	1,500	1,410	1,300	1,310	1,500	1,320	1,260	1,290	1,470	1,580	1,600	1,520
14	1,480	1,360	1,290	1,310	1,690	1,310	1,300	1,230	1,460	1,580	1,590	1,520
15	1,470	1,410	1,320	1,290	1,640	1,320	1,290	1,050	1,500	1,560	1,600	1,550
16	1,460	1,380	1,320	1,280	1,500	1,320	1,220	1,250	1,500	1,550	1,610	1,540
17	1,410	1,380	1,330	1,230	1,510	1,350	1,220	1,250	1,460	1,550	1,610	1,550
18	1,470	1,360	1,320	1,230	1,510	1,380	1,260	1,190	1,450	1,560	1,610	1,540
19	1,480	1,380	1,320	1,280	1,510	1,300	1,290	1,300	1,460	1,570	1,620	1,520
20	1,480	1,380	1,310	1,280	1,510	1,230	1,290	1,300	1,450	1,580	1,620	1,500
21	1,490	1,320	1,310	1,280	1,490	1,230	1,270	1,320	1,480	1,580	1,600	1,500
22	1,490	1,400	1,290	1,230	1,490	1,230	1,300	1,340	1,500	1,590	1,630	1,640
23	1,410	1,400	1,290	1,230	1,500	1,260	1,320	1,400	1,500	1,620	1,590	1,540
24	1,420	1,400	1,320	1,230	1,480	1,210	1,320	1,410	1,490	1,530	1,590	1,620
25	1,400	1,320	1,320	1,240	1,470	1,230	1,280	1,390	1,490	1,650	1,590	1,600
26	1,400	1,380	1,320	1,250	1,410	1,220	1,270	1,430	1,470	1,640	1,620	1,600
27	1,400	1,390	1,240	1,220	1,420	1,050	1,280	1,380	1,490	1,640	1,620	1,680
28	1,480	1,330	1,220	1,220	1,350	1,230	1,280	1,370	1,500	1,600	1,650	1,640
29	1,440		1,210	1,220	1,390	1,320	1,310	1,340	1,500	1,620	1,690	1,640
30	1,440		1,310	1,260	1,390	1,360	1,320	1,450		1,630	1,710	1,640
31	1,450		1,310		1,360		1,320	1,440		1,600		1,640

COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

	No Samples Collected During 1990	
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WESTERN BOUNDARY WATER BULLETIN - 1990 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

RAINFALL ON THE COLORADO RIVER WATERSHED
IN MILLIMETRES

Tabulated below are monthly records of rainfall at stations located in California and Arizona in the United States and in Baja California and Sonora in Mexico, with averages for their periods of record. Records of daily rainfall amounts, where available, are on file in the offices of the United States or Mexican Sections of the Commission. For location, elevation, period of record, and the observer, see alphabetical listings of these stations on following page in this bulletin.

IN THE UNITED STATES

Month	Brawley, California		El Centro, California		Blythe, California		Yuma Citrus Station, Arizona		Bullhead City, Arizona	
	1990	Average 1931-1990	1990	Averages 1931-1990	1990	Averages 1931-1990	1990	Averages 1931-1990	1990	Averages 1978-1990
Jan.	0	9	5	10	8	11	8	10	25	27
Feb.	0	8	0	9	0	10	2	8	12	18
Mar.	0	6	0	5	3	10	0	6	6	22
April	0	2	1	2	0	3	1	3	3	7
May	8	1	0	0	0	1	0	0	14	4
June	2	0	2	0	1	1	0	1	0	0
July	0	2	6	2	9	5	6	6	42	14
Aug.	35	10	23	9	15	20	4	15	9	28
Sept.	25	8	13	7	6	10	0	9	14	13
Oct.	4	7	0	7	0	7	34	10	6	9
Nov.	0	5	0	5	0	7	0	5	1	15
Dec.	0	11	0	11	0	13	1	11	0	20
Yearly	74	69	50	67	42	98	56	84	132	177

IN MEXICO

Month	Los Algodones, Baja California		Mexicali, Baja California		Bataques, Baja California		San Luis, R. C., Sonora		Delta, Baja California	
	1990	Average 1948-1990	1990	Averages 1926-1990	1990	Averages 1948-1990	1990	Averages 1949-1990	1990	Averages 1948-1990
Jan.	1	10	1	9	3	9	#	8	0	8
Feb.	T	5	T	8	#	5	#	7	0	6
Mar.	0	4	0	6	#	3	0	5	0	4
April	0	2	T	2	0	2	0	1	0	2
May	0	T	2	T	0	T	0	1	0	T
June	0	T	1	T	0	1	0	T	0	T
July	0	3	0	3	0	2	0	5	0	2
Aug.	T	10	25	10	20	7	0	11	15	7
Sept.	0	4	2	9	10	4	#	6	#	6
Oct.	0	6	17	8	1	7	#	9	2	8
Nov.	0	4	0	4	0	3	0	10	0	3
Dec.	T	9	T	18	0	7	0	15	#	11
Yearly	1	60	48	80		50		72		55

Month	Colonia Juarez, Baja California		Laguna Salada Baja California		Riito, Sonora		San Felipe, Baja California		El Centinela, Baja California	
	1990	Average 1952-1990	1990	Averages 1975-1990	1990	Averages 1959-1990	1990	Averages 1969-1990	1990	Averages 1978-1990
Jan.	5	12	#	7	2	7	0	8	#	6
Feb.	0	7	#	10	0	6	0	4	0	5
Mar.	#	7	0	2	0	4	0	3	0	4
April	0	2	0	2	0	1	0	1	0	0
May	0	1	0	1	0	T	0	1	0	0
June	0	T	#	0	0	1	0	1	1	T
July	0	5	#	4	0	2	0	3	2	T
Aug.	21	10	#	14	0	7	0	11	0	7
Sept.	15	7	#	15	0	11	0	9	0	1
Oct.	5	11	#	6	0	9	0	5	0	6
Nov.	0	6	#	3	0	5	0	5	0	1
Dec.	0	10	#	18	0	10	0	10	0	10
Yearly		62		121	2	66	0	64		49

T Trace

Missing record

LOCATION OF RAINFALL STATIONS ON THE COLORADO RIVER WATERSHED

The precipitation records of the stations listed alphabetically below began on the date shown and extend through 1990.

IN THE UNITED STATES

NAME OF STATION	LATITUDE	LONGITUDE	φ ELEV. (Metres)	RECORD BEGAN	OBSERVER
* Blythe, California	33° 37'	114° 36'	81.69	1909	State Division of Forestry
Brawley, California	32° 57'	115° 33'	30.48	1908	Agricultural Research Service
Bullhead City, Arizona	35° 07'	114° 36'	176.78	1980	Bullhead City Fire Department
El Centro, California	32° 46'	115° 34'	9.14	1930	El Centro Water Department
Yuma Citrus Station, Arizona	32° 37'	114° 39'	58.22	1923	University of Arizona Experimental Farm

IN MEXICO

NAME OF STATION	LATITUDE	LONGITUDE	φ ELEV. (Metres)	RECORD BEGAN	OBSERVER
Bataques, Baja California	32° 34'	115° 00'	**20.12	1948	# S. A. R. H.
Colonia Juarez, Baja California	32° 18'	115° 05'	14.94	1952	S. A. R. H.
Delta, Baja California	32° 21'	115° 11'	**11.89	1948	S. A. R. H.
El Centinela, Baja California	32° 35'	115° 45'	49.99	1978	S. A. R. H.
Laguna Salada, Baja California	32° 12'	115° 44'	2.14	1975	S. A. R. H.
Los Algodones, Baja California	32° 42'	114° 44'	35.05	1948	S. A. R. H.
Mexicali, Baja California	32° 40'	115° 28'	3.96	1926	S. A. R. H.
Riito, Sonora	32° 13'	115° 01'	13.11	1959	S. A. R. H.
San Felipe, Baja California	31° 01'	114° 51'	21.95	1969	S. A. R. H.
San Luis, R. C., Sonora	32° 28'	114° 51'	39.93	1949	S. A. R. H.

* Not shown on map

φ Elevation above mean sea level except Brawley and El Centro, which are elevations below mean sea level

** Elevation obtained from International Boundary and Water Commission topographic maps

Ministry of Agriculture and Hydraulic Resources

EVAPORATION IN THE COLORADO RIVER BASIN
IN MILLIMETRES

Tabulated below are records of evaporation observed at one station in Arizona and at two stations in Baja California. The station in the United States is operated by the University of Arizona Experimental Farm. The stations in Mexico are operated by the Ministry of Agriculture and Hydraulic Resources. The type of pan used at all these stations was the National Weather Service standard pan of 1.22 metres diameter. For specific location of these stations, refer to data opposite the same station name shown in "Location of Rainfall Stations," in this bulletin.

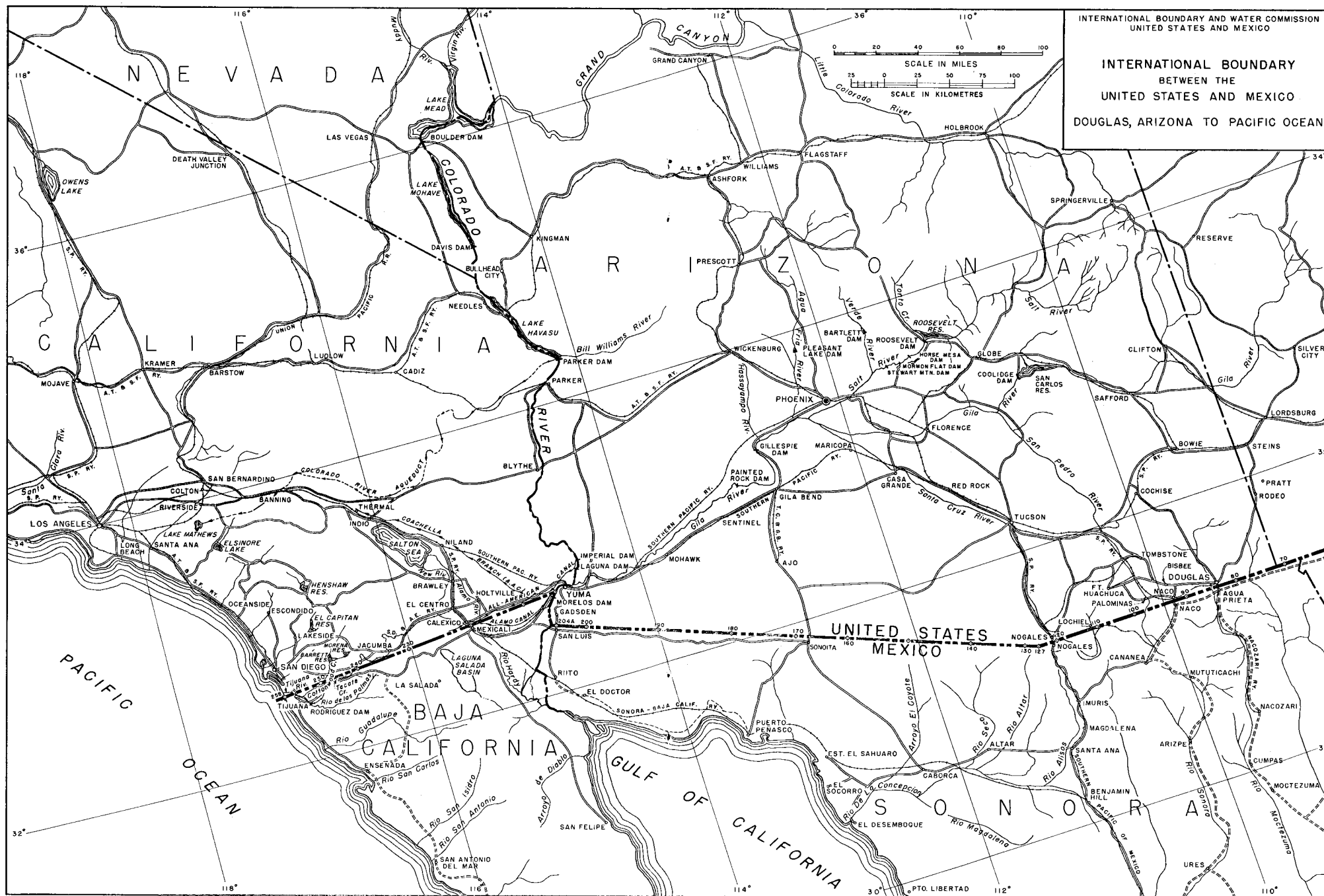
IN THE UNITED STATES

Month	Yuma Citrus Station, Arizona	
	1990	Average 1931-1990
Jan.	116	99
Feb.	#	121
Mar.	194	188
April	241	254
May	319	328
June	364	360
July	364	386
Aug.	320	339
Sept.	247	268
Oct.	206	190
Nov.	129	124
Dec.	118	93
Yearly		2,750

IN MEXICO

Month	Delta, Baja California		Colonia Juarez, Baja California	
	1990	Average 1948-1990	1990	Averages 1970-1990
Jan.	74	86	56	92
Feb.	145	112	64	112
Mar.	#	154	#	166
April	186	199	82	203
May	199	253	35	261
June	209	272	129	311
July	77	284	181	313
Aug.	207	263	246	273
Sept.	#	216	98	233
Oct.	85	152	41	177
Nov.	0	105	30	118
Dec.	#	91	70	80
Yearly		1,994		2,470

Missing record



TEMPERATURE IN THE COLORADO RIVER BASIN
IN DEGREES CELSIUS

The maximum, minimum, and monthly mean temperature observations for United States stations are from daily readings of thermometers generally exposed in a shelter located a few metres above sod-covered ground. The maximum and minimum temperatures shown for the stations in Mexico are from daily maximum and minimum thermometer observations, with maximum and minimum for their periods of record. For specific location, elevation, period of record, and the observer, refer to data opposite same station name as shown in "Location of Rainfall Stations," in this bulletin.

IN THE UNITED STATES

Month	Blythe, California				Yuma Citrus Station, Arizona				Brawley, California			
	1990				1990				1990			
	Mean	Max.	Min.	Average 1931-90	Mean	Max.	Min.	Average 1931-90	Mean	Max.	Min.	Average 1931-90
Jan.	10.7	23.9	-1.1	11.5	11.5	25.0	-0.6	11.8	12.1	27.2	-1.7	12.2
Feb.	12.8	30.0	-3.3	14.1	12.1	30.0	-3.9	13.9	13.2	30.6	-3.9	14.5
Mar.	18.3	36.1	2.8	17.3	17.8	35.0	-0.6	16.8	18.2	34.4	2.8	17.4
April	23.1	40.6	9.4	21.3	21.9	37.8	8.3	20.5	22.4	37.8	9.4	21.1
May	25.8	39.4	11.7	25.4	23.7	38.9	10.0	24.4	24.1	39.4	11.1	25.1
June	31.6	48.3	15.0	29.8	30.3	50.0	12.8	28.8	29.9	49.4	13.9	29.5
July	34.3	47.2	20.0	33.6	33.2	45.6	18.9	32.7	33.3	46.7	19.4	33.2
Aug.	32.2	44.4	17.8	32.7	31.9	43.9	16.7	32.3	31.6	43.9	17.2	32.9
Sept.	29.7	45.0	13.3	29.3	29.9	45.6	13.9	29.3	30.2	46.7	15.6	30.0
Oct.	23.6	37.8	8.3	22.9	23.6	37.2	8.9	23.1	23.8	37.8	8.3	23.9
Nov.	16.4	31.7	2.2	15.7	16.6	32.2	2.2	16.3	17.3	33.3	0.0	16.9
Dec.	9.0	22.8	-4.4	11.7	10.5	25.0	-2.2	12.4	10.4	25.6	-5.6	12.8
Yearly	22.3	48.3	-4.4	22.1	21.9	50.0	-3.9	21.9	22.2	49.4	-5.6	22.5

Month	El Centro, California				Bullhead City, Arizona							
	1990				1990							
	Mean	Max.	Min.	Average 1931-90	Mean	Max.	Min.	Average 1978-90				
Jan.	12.8	27.2	0.6	12.3	11.6	23.3	0.6	12.0				
Feb.	14.2	28.9	-0.6	14.6	13.8	29.4	-1.1	14.5				
Mar.	18.7	33.3	3.3	17.3	19.2	35.6	3.9	17.8				
April	22.4	35.6	11.1	20.9	23.8	39.4	10.0	22.4				
May	24.7	39.4	12.2	25.1	26.8	40.0	12.8	27.1				
June	31.1	48.9	13.9	29.6	33.7	48.9	18.9	32.6				
July	33.5	45.6	20.0	33.2	35.6	48.3	21.7	35.1				
Aug.	31.8	43.3	18.9	32.8	33.5	45.6	17.2	34.1				
Sept.	30.4	45.0	17.2	29.8	31.3	46.1	16.7	30.2				
Oct.	24.4	37.2	10.6	23.7	24.6	37.8	11.1	23.6				
Nov.	17.5	30.6	2.8	16.8	17.6	30.0	5.6	16.6				
Dec.	11.3	26.7	-5.6	12.7	9.8	22.2	-4.4	11.7				
Yearly	22.7	48.9	-5.6	22.4	23.4	48.9	-4.4	23.1				

IN MEXICO

Month	Los Algodones, Baja California				Mexicali, Baja California				Bataques, Baja California			
	1990		1948-1990		1990		1926-1990		1990		1948-1990	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	25.0	-1.0	31.0	-5.0	26.0	4.0	34.0	-7.0	28.0	-2.0	45.0	-9.0
Feb.	32.0	0	35.0	-2.0	30.0	-3.0	34.0	-5.0	#	#	37.0	-6.0
Mar.	37.0	1.0	38.0	0	33.0	4.0	38.0	12.0	#	#	45.0	-4.0
April	38.0	9.0	43.0	3.0	40.0	12.0	41.0	1.0	39.0	10.0	48.0	-9.0
May	44.0	10.0	47.0	6.0	40.0	12.0	47.0	6.0	39.0	11.0	51.0	1.0
June	50.0	12.0	52.0	11.0	49.0	12.0	49.0	9.0	48.0	13.0	57.0	6.0
July	50.0	13.0	48.0	13.0	46.0	23.0	48.0	13.0	46.0	19.0	56.0	7.0
Aug.	45.0	18.0	49.0	16.0	44.0	20.0	49.0	12.0	44.0	18.0	54.0	8.0
Sept.	44.0	17.0	50.0	10.0	47.0	18.0	50.0	9.0	47.0	14.0	57.0	4.0
Oct.	40.0	10.0	44.0	0	39.0	13.0	44.0	0	39.0	9.0	48.0	0
Nov.	34.0	6.0	38.0	-3.0	33.0	4.0	40.0	-2.0	34.0	1.0	46.0	0
Dec.	31.0	-2.0	32.0	-5.0	23.0	0	32.0	-5.0	25.0	-3.0	36.0	-4.0
Yearly	50.0	-2.0	52.0	-5.0	49.0	-3.0	50.0	-7.0			57.0	-9.0

Missing record

TEMPERATURE IN THE COLORADO RIVER BASIN
IN DEGREES CELSIUS

IN MEXICO

Month	Riito, Sonora				San Felipe Baja California				San Luis, R. C., Sonora			
	1990		1949-1990		1990		1969-1990		1990		1949-1990	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	29.0	4.0	33.0	-7.0	23.0	3.0	37.0	-1.0	#	#	38.0	-7.0
Feb.	32.0	-3.0	35.0	-6.0	22.0	3.0	39.0	0	#	#	43.0	-3.0
Mar.	37.2	2.0	38.0	-7.0	30.0	8.0	40.0	0	39.0	3.0	48.0	-2.0
April	41.0	12.0	43.0	2.0	33.0	10.0	45.0	1.0	40.0	9.0	46.0	2.0
May	40.0	7.0	46.0	5.0	39.0	12.0	49.0	5.0	39.0	9.0	49.0	5.0
June	45.0	12.0	51.0	7.0	45.0	20.0	51.0	10.0	45.0	11.0	52.0	7.0
July	45.0	20.0	60.0	11.0	40.0	20.0	51.0	10.0	43.0	15.0	52.0	10.0
Aug.	45.0	19.0	50.0	8.0	39.0	21.0	57.0	5.0	43.0	18.0	52.0	13.0
Sept.	46.0	10.0	48.0	4.0	45.0	16.0	52.0	3.0	#	#	48.0	10.0
Oct.	38.0	10.0	46.0	-1.0	39.0	10.0	47.0	-5.0	#	#	48.0	0
Nov.	30.0	2.0	48.0	-3.0	33.0	7.0	48.0	-6.0	36.0	3.0	45.0	-2.0
Dec.	24.0	1.0	30.0	-6.0	26.0	3.0	36.0	-2.0	34.0	3.0	39.0	-5.0
Yearly	46.0	-3.0	60.0	-7.0	45.0	3.0	57.0	-6.0			52.0	-7.0

Month	Delta, Baja California				Colonia Juarez, Baja California				Laguna Salada, Baja California			
	1990		1948-1990		1990		1964-1990		1990		1975-1990	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	29.0	1.0	40.0	-3.0	#	#	33.0	-7.0	#	#	29.0	-8.0
Feb.	30.0	5.0	40.0	-2.0	#	#	39.0	-6.0	#	#	35.0	-3.0
Mar.	40.0	7.0	45.0	-2.0	#	#	36.0	-4.0	39.0	0	39.0	0
April	41.0	8.0	48.0	0	39.0	8.0	46.0	-1.0	42.0	5.0	42.0	2.0
May	42.0	8.0	54.0	0	45.0	8.0	47.0	2.0	45.0	7.0	46.0	4.0
June	50.0	8.0	56.0	2.0	49.0	11.0	50.0	4.0	#	#	49.0	10.0
July	50.0	10.0	57.0	7.0	46.0	18.0	50.0	7.0	#	#	50.0	12.0
Aug.	46.0	16.0	60.0	16.0	44.0	16.0	48.0	10.0	#	#	48.0	11.0
Sept.	#	#	57.0	4.0	46.0	11.0	50.0	4.0	#	#	48.0	9.0
Oct.	48.0	11.0	47.0	1.0	39.0	10.0	42.0	2.0	#	#	48.0	2.0
Nov.	42.0	17.0	50.0	0	31.0	1.0	40.0	-4.0	#	#	35.0	-5.0
Dec.	#	#	40.0	-3.0	25.0	0	37.0	-7.0	#	#	30.0	-7.0
Yearly			60.0	-3.0			50.0	-7.0			50.0	-8.0

Month	El Centinela, Baja California											
	1990		1977-1990									
	Max.	Min.	Max.	Min.								
Jan.	#	#	30.0	1.0								
Feb.	35.0	22.0	35.0	-4.0								
Mar.	37.0	6.0	37.0	4.0								
April	36.0	12.0	41.0	8.0								
May	36.0	16.0	45.0	11.0								
June	46.0	21.0	48.0	10.0								
July	46.0	24.0	49.0	20.0								
Aug.	46.0	21.0	46.0	18.0								
Sept.	50.0	19.0	50.0	11.0								
Oct.	41.0	12.0	44.0	10.0								
Nov.	35.0	5.0	38.0	4.0								
Dec.	28.0	-3.0	29.0	-3.0								
Yearly			50.0	-4.0								

Missing record

IRRIGATED AREAS ALONG COLORADO RIVER BELOW IMPERIAL DAM

1990

The total drainage area within the Colorado River basin is about 637,100 square kilometres, of which 478,100 square kilometres lie above Imperial Dam and about 159,000 square kilometres, are below the dam. Of the area below Imperial Dam, 153,800 square kilometres are in the United States and about 5,180 square kilometres are in Mexico. The area below Imperial Dam includes the Gila River watershed with a total area of about 150,700 square kilometres, of which about 2,850 square kilometres are in Mexico.

The irrigated areas tabulated below comprise the areas in the United States and Mexico which are served by diversions from the Colorado River at or below Imperial Dam. The diversions are supplemented by some pumping from wells in both countries. The areas in the United States include: 1) those within the U. S. Bureau of Reclamation Projects and in the North and South Gila Valleys located near Yuma, Arizona, the data for which are furnished by the U. S. Bureau of Reclamation; 2) those within the Coachella Valley, California, the data for which are furnished by the U. S. Bureau of Reclamation; and 3) those within the Imperial Valley, California, the data for which are furnished by the U. S. Bureau of Reclamation. The areas in Mexico include those in the Mexicali Valley, located in the states of Baja California and Sonora, the data for which are furnished by the Ministry of Agriculture and Hydraulic Resources of Mexico. The areas tabulated below refer to the total areas farmed, and insofar as possible, duplication of irrigated areas because of double cropping has been eliminated.

Point of Diversion from Colorado River and Designation of Areas	Total Irrigated Areas Hectares
IN THE UNITED STATES:	
Imperial Dam	
Yuma Valley Diversion	18,519
Reservation Diversion	5,354
Yuma Mesa	7,063
Yuma Aux. Project Unit "B" (Yuma Mesa)	1,100
South Gila Valley	3,896
North Gila Valley	2,557
Wellton-Mohawk	24,413
Coachella Valley	24,707
Imperial Valley	187,384
Warren Act	32
Non-Project lands adjacent to Colorado River	5,083
Total in United States	280,108
IN MEXICO:	
Morelos Dam	
Mexicali Valley	* 196,423
Total in United States and Mexico	476,531

* An estimated 33% of total hectares is served by pumping groundwater in the Mexicali Valley

10-2545.80 ALAMO RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Staff gage located on the right bank of the river, about 11.3 kilometres east of Calexico, California, immediately downstream from the international land boundary between the United States and Mexico and a few feet upstream from a 1.22-metre Cipolletti weir in the throat of a twin-tube concrete culvert which carries the river flow under the All-American Canal.

RECORDS: Computed on the basis of head on the Cipolletti weir from daily staff gage readings, and weir ratings as determined by monthly current meter measurements. Records obtained and furnished by Imperial Irrigation District. Records available June 1942 through 1990.

REMARKS: The flow at this station normally comprises seepage from the All-American Canal and drainage water from the Mexicali Valley which enters the United States.

EXTREMES: Maximum mean daily discharge, 7.31 m³/sec (estimated), April 13, 1946; minimum discharge, no flow July 22-23, 29-30, 1949. Prior to the period of record, and since 1900, considerably higher flows occurred. During the years 1905 to 1907, when the Colorado River flowed into the Salton Sea, a part of its flow passed through the Alamo River channel.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.08	0.07	0.10	0.09	0.09	0.07	0.07	0.06	0.07	0.06	0.09	0.07
2	.10	.07	.09	.09	.09	.07	.07	.06	.06	.06	.08	.07
3	.09	.07	.08	.08	.09	.07	.09	.07	.06	.07	.08	.08
4	.08	.07	.09	.08	.08	.08	.08	.06	.07	.07	.08	.09
5	.07	.08	.09	.11	.10	.08	.08	.06	.06	.07	.08	.09
6	.07	.08	.10	.09	.08	.07	.08	.06	.06	.08	.08	.09
7	.07	.07	.09	.09	.08	.07	.09	.06	.07	.07	.08	.10
8	.07	.07	.13	.09	.08	.07	.11	.06	.07	.07	.08	.10
9	.07	.08	.08	.09	.08	.07	.09	.06	.06	.07	.08	.09
10	.07	.10	.08	.08	.08	.08	.07	.06	.07	.07	.08	.09
11	.07	.09	.08	.10	.07	.09	.07	.05	.07	.08	.08	.09
12	.08	.10	.08	.09	.08	.08	.07	.06	.07	.08	.08	.09
13	.08	.09	.08	.09	.08	.08	.07	.06	.08	.07	.08	.09
14	.08	.07	.08	.08	.08	.08	.07	.07	.06	.07	.09	.11
15	.08	.08	.08	.09	.08	.09	.07	.08	.06	.07	.07	.10
16	.08	.08	.07	.09	.07	.09	.08	.09	.06	.07	.11	.09
17	.08	.08	.08	.09	.07	.09	.08	.08	.07	.08	.09	.09
18	.08	.10	.08	.09	.07	.09	.08	.08	.06	.07	.12	.09
19	.08	.08	.08	.09	.07	.08	.07	.07	.06	.07	.09	.09
20	.08	.07	.08	.09	.06	.07	.09	.07	.06	.08	.09	.09
21	.08	.07	.08	.08	.06	.07	.07	.08	.06	.08	.09	.09
22	.08	.07	.09	.10	.07	.07	.08	.09	.06	.08	.08	.10
23	.08	.07	.09	.09	.07	.07	.07	.07	.05	.08	.08	.09
24	.07	.07	.09	.08	.07	.08	.07	.07	.06	.11	.10	.10
25	.07	.07	.09	.09	.07	.08	.07	.09	.06	.08	.09	.09
26	.07	.09	.09	.08	.09	.07	.08	.08	.06	.10	.08	.08
27	.07	.09	.09	.08	.08	.07	.07	.08	.06	.07	.08	.08
28	.07	.09	.09	.08	.07	.06	.07	.08	.06	.09	.08	.08
29	.07	.09	.09	.09	.07	.06	.07	.08	.06	.08	.08	.07
30	.07	.09	.09	.08	.07	.07	.07	.08	.06	.11	.07	.07
31	.07	.09	.09	.07	.07	.07	.07	.09	.10	.10	.07	.07
Sum	2.36	2.22	2.70	2.64	2.37	2.27	2.37	2.21	1.89	2.41	2.54	2.72
Current Year 1990												
Period 1943-1990												
Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres				
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum	
Jan.	0.16	0.12	2	0.10	125	0.07	0.08	204	364	3,441	122	
Feb.	.16	.12	12	.10	1	.07	.08	192	332	3,481	111	
Mar.	.19	.13	8	.13	16	.07	.09	233	378	3,890	107	
April	.17	.13	5	.11	124	.08	.09	228	399	2,741	120	
May	.16	.12	5	.10	120	.06	.08	205	318	2,219	90.0	
June	.15	.12	111	.09	128	.06	.08	196	306	2,080	75.2	
July	.17	.12	8	.11	112	.07	.08	205	284	2,112	72.8	
Aug.	.15	.10	16	.09	11	.05	.07	191	333	2,062	81.0	
Sept.	.13	.11	0	.08	23	.06	.06	163	310	1,734	103	
Oct.	.17	.12	124	.11	1	.06	.08	208	328	2,276	76.0	
Nov.	.18	.13	18	.12	115	.07	.08	219	340	2,566	77.0	
Dec.	.17	.13	14	.11	12	.07	.09	235	325	2,080	98.7	
Yearly	0.19	0.10		0.13		0.05	0.08	2,479	4,017	27,317	1,321	

♠ Mean daily

! And other days

10-2549.70 NEW RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder located on the left (west) bank of the river in the limits of the city of Calexico, California, 427 metres downstream (north) from the international land boundary between the United States and Mexico. Measurements are made from a foot bridge at the gage.

RECORDS: Based on a continuous record of gage heights and current meter measurements by the Imperial Irrigation District. Records computed and furnished by the District. Records available: June 1942 through 1990.

REMARKS: The New River flows northward from Mexico into the United States and thence into the Salton Sea. The flow at this station normally comprises 1) a portion of the waste and drainage water from the irrigation system in the Mexicali Valley, and 2) sewage and other wastes from Mexicali, Baja California. Flood waters enter the river from local drainage in Mexico, and such waters can reach damaging rates during violent desert storms. Waste flows from the Mexican system of canals are limited to an average annual quantity of 43,172,000 m³ during any successive five-year period under the provisions of Minute No. 197 of the Commission.

EXTREMES: Maximum mean daily discharge, 29.2 m³/sec on December 9, 1982; minimum mean daily discharge, 0.06 m³/sec on May 14, 1945. Prior to the period of record, and since 1900, much higher flows occurred. During the years 1905 to 1907, when the Colorado River flowed into the Salton Sea, a considerable part of its flow passed through the New River channel.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.32	6.06	6.60	5.49	5.32	6.29	4.50	4.79	4.87	5.72	3.96	4.22
2	7.14	5.58	6.34	5.52	5.27	6.12	4.53	4.79	4.56	5.72	3.94	4.36
3	6.91	6.00	5.98	5.44	5.41	5.92	4.45	4.76	4.79	5.98	3.91	4.81
4	7.39	5.72	6.12	5.35	5.98	5.98	4.50	5.10	4.67	5.86	3.96	4.73
5	6.63	5.58	6.32	5.18	5.55	5.75	4.50	5.30	5.52	5.01	4.33	4.36
6	6.15	5.69	6.46	5.69	5.04	5.72	4.02	5.10	5.35	5.18	4.22	4.39
7	5.92	6.03	6.00	5.52	4.76	5.38	4.05	4.73	6.12	4.93	4.19	4.50
8	6.03	6.17	5.32	5.30	4.59	5.21	4.16	4.59	6.74	4.28	4.22	4.47
9	6.09	6.34	5.13	5.27	4.59	5.21	4.05	4.47	5.49	3.82	4.25	4.56
10	5.98	6.12	5.21	5.49	4.39	4.67	4.13	4.42	4.36	4.11	4.36	4.62
11	5.92	6.03	5.41	5.89	4.56	4.50	4.16	4.64	4.05	4.16	4.22	4.62
12	6.09	5.92	5.35	5.44	4.22	4.53	4.30	4.36	4.11	4.25	4.50	4.73
13	6.12	5.86	6.17	5.44	4.39	4.39	4.30	4.67	4.13	4.33	4.45	4.73
14	6.34	5.52	5.92	5.35	4.33	4.64	4.22	5.49	4.36	4.33	4.56	4.84
15	6.51	5.75	5.30	5.47	4.45	4.50	4.08	5.30	4.45	4.39	4.53	4.81
16	10.1	5.58	5.38	5.24	4.59	4.87	4.56	5.64	4.36	4.64	4.79	4.93
17	10.8	5.58	5.35	5.24	4.33	4.87	5.01	6.60	4.30	4.87	4.62	4.96
18	7.59	5.69	5.49	5.24	4.16	5.38	4.53	7.84	4.42	4.53	4.50	5.78
19	7.45	5.55	5.81	5.18	4.62	5.72	4.53	7.48	4.42	4.30	4.59	5.75
20	7.05	6.37	5.44	5.44	4.36	5.78	3.96	7.22	4.53	4.13	4.30	6.26
21	6.66	6.17	5.44	5.44	4.39	5.38	3.88	6.60	4.59	4.16	4.25	6.15
22	6.63	6.06	5.47	5.13	4.50	5.01	3.94	5.86	4.11	4.30	4.36	5.83
23	6.34	6.29	6.09	5.32	4.67	4.62	3.96	5.72	4.25	4.19	4.05	5.92
24	6.23	6.15	5.72	5.44	4.90	4.50	4.05	5.75	4.56	4.16	4.05	5.98
25	6.29	6.23	5.47	5.18	5.38	4.90	4.13	5.61	4.39	4.13	4.08	6.34
26	6.34	6.63	5.35	5.18	5.44	4.59	4.98	5.35	4.19	4.30	4.13	6.49
27	5.98	6.66	5.38	5.75	5.41	4.76	4.96	5.15	4.13	4.28	4.11	7.16
28	5.78	6.32	5.38	5.64	5.69	4.47	4.90	5.44	4.16	4.13	3.94	6.85
29	6.12		5.78	5.41	6.00	4.36	4.53	5.47	4.62	4.08	3.85	7.11
30	6.54		5.47	5.35	6.68	4.45	4.73	5.81	5.38	4.16	4.08	6.46
31	6.60		5.58		6.49		4.93	5.30		4.11		5.92
Sum	208.04	167.65	176.23	162.02	154.46	152.47	135.53	169.35	139.98	140.54	127.30	166.64

Current Year 1990

Period 1943-1990

Month	Extreme Gage ** Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	ϕ High	ϕ Low	Day	ϕ High	Day	ϕ Low		Total	Average	Maximum	Minimum
Jan.	12.31	12.52	17	10.8	28	5.78	6.71	17,975	12,299	27,387	2,160
Feb.	12.43	12.55	27	6.66	14	5.52	5.99	14,485	10,865	26,416	1,552
Mar.	12.44	12.59	1	6.60	9	5.13	5.68	15,226	12,180	31,213	1,243
April	12.51	12.59	11	5.89	22	5.13	5.40	13,999	12,591	34,066	1,715
May	12.43	12.70	30	6.68	18	4.16	4.98	13,345	11,481	29,740	776
June	12.47	12.68	1	6.29	29	4.36	5.08	13,173	9,744	25,024	1,341
July	12.61	12.73	17	5.01	21	3.88	4.37	11,710	10,369	28,368	1,008
Aug.	12.30	12.68	18	7.84	12	4.36	5.46	14,632	11,976	34,066	1,405
Sept.	12.42	12.71	8	6.74	11	4.05	4.67	12,094	11,228	29,251	2,214
Oct.	12.50	12.73	3	5.98	9	3.82	4.53	12,143	11,279	28,072	2,567
Nov.	12.63	12.73	16	4.79	29	3.85	4.24	10,999	10,621	25,310	3,063
Dec.	12.38	12.69	27	7.16	1	4.22	5.38	14,398	12,060	28,104	2,175
Yearly	12.30	12.73		10.8		3.82	5.21	164,179	136,693	330,444	30,310

* Mean daily

** Metres below mean sea level

10-2549.60 WASTES FROM MEXICALI POTABLE WATER PLANT TO NEW RIVER IN MEXICO

DESCRIPTION: A 3.5-metre Parshall flume installed by the State Commission of Public Services of Mexicali. Located 2.0 kilometres upstream of the pumping plant on the supply canal. Excess water discharges into an open channel, thence into a 91 centimetre diameter pipe that empties into Rivera Drain (Drain 134), which is 2.0 kilometres below the plant and 2.0 kilometres south of the international boundary. From this point the waste is carried by a closed concrete box conduit into New River.

RECORDS: During 1990 the mean daily flows were computed from the total inflow to the potable water plant as measured at the Parshall flume, less the water pumped to the city and the water used in the maintenance of the plant. The records are obtained and furnished by the State Commission of Public Services of Mexicali. Records available: January 1968 through December 1990.

REMARKS: The plant began operation on September 28, 1963 by the State Commission of Public Services of Mexicali. Before 1968 the flow was small and infrequent. The potable water plant obtains water from the West Main Canal, which is a part of Mexico's system of canals in the Colorado Irrigation System. Excess water discharges into a closed conduit that empties into New River 1.4 kilometres upstream of the international boundary.

EXTREMES: Maximum instantaneous discharge, 2.32 m³/sec on March 26, 1969; minimum instantaneous discharge, zero during several days in the years 1977 through 1990.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.05	0	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.08	0.05	0.05
2	.05	.05	.05	.05	.02	.05	.06	.05	0	.05	.06	.05
3	.05	.05	.05	.05	.05	0	.05	.07	.02	.05	.03	.05
4	.05	.05	.05	.05	.05	.02	.05	.05	.02	.05	.05	.05
5	.05	.05	.05	.05	.05	0	.03	.05	.05	.05	.05	.05
6	.05	.05	.05	.05	.05	.02	.03	.03	.05	.05	.05	.05
7	.05	.05	.05	.05	0	.08	.05	.02	.05	.05	.02	.05
8	.05	.05	.05	.05	.05	0	.07	.05	.05	.03	.05	.05
9	.05	.05	.05	.03	0	.05	.03	.05	.03	.05	.05	.06
10	.05	.05	.05	0	.05	.05	.08	.05	.03	.05	.05	.06
11	.05	.05	.05	.05	.03	0	.08	.05	.05	.03	.05	.05
12	.05	.05	.05	0	.05	.05	.08	.06	.05	.03	.05	.05
13	.05	.05	.05	.05	.06	.05	.07	.05	.05	.03	.05	.05
14	.05	.05	.05	0	.05	.02	.06	.03	.05	.03	.05	.05
15	.05	0	.05	.05	.05	.14	.09	.06	0	.05	.05	.05
16	.05	.05	.05	.05	.05	.05	.05	.07	.01	.03	.05	.05
17	.05	0	.05	.03	.05	.05	.06	.06	.05	.05	.05	.05
18	.05	0	.05	0	.05	.05	.05	.06	.05	.05	.05	.08
19	.05	0	.05	.09	.05	.05	.05	.03	.05	.03	.05	.05
20	.05	.05	.05	.06	.05	.05	.03	.05	.05	.03	.05	.05
21	.05	.05	.05	.05	0	.02	.05	.05	.05	.05	.05	0
22	.05	.02	.05	.05	.05	.05	.07	.05	.05	.05	.03	.03
23	.05	.05	.05	.05	.05	.05	.07	.03	.05	.06	.03	.02
24	.05	.06	.05	.05	.06	.05	.05	.06	.05	.05	0	.02
25	.05	.07	.05	.05	.05	.05	.05	.05	.05	.05	.03	.03
26	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.02
27	.05	.03	.05	.05	.05	.03	.05	0	.05	.06	.05	.01
28	.05	.02	.05	0	.05	.05	.05	.05	.05	.05	.05	0
29	.05		.05	.05	.05	.05	.06	.05	.05	.05	.05	0
30	.05		.05	.05	.05	.05	.05	.05	.05	.05	.05	.02
31	.05		.05		.07		.05	.05		.05		0
Sum	1.55	1.10	1.55	1.26	1.39	1.28	1.72	1.48	1.26	1.44	1.35	1.20
Current Year 1990										Period 1968-1990		
Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres				
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum	
Jan.			1	0.05	1	0.05	0.05	134	186	641	0	
Feb.			25	.07	1	0	.04	95.0	118	384	0	
Mar.			9	.08	117	.03	.05	134	235	1,074	41.5	
April			19	.09	110	0	.04	109	225	532	84.0	
May			31	.07	7	0	.04	120	239	537	57.0	
June			15	.14	3	0	.04	111	216	504	25.9	
July			15	.09	5	.03	.06	149	269	651	0	
Aug.			3	.07	27	0	.05	128	293	735	95.0	
Sept.			1	.05	2	0	.04	109	274	677	71.7	
Oct.			1	.08	8	.03	.05	124	256	625	113	
Nov.			2	.06	24	0	.05	117	227	622	67.4	
Dec.			18	.08	121	0	.04	104	212	737	40.6	
Yearly				0.14		0	0.05	1,434	2,750	6,610	1,160	

! And other days

WESTERN BOUNDARY WATER BULLETIN - 1990 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

10-2549.65 WASTE WATERS FROM MEXICAN SYSTEM OF CANALS
ENTERING THE UNITED STATES

DESCRIPTION: During 1990 the only flow to the New River in Mexico was waste from the City of Mexicali Potable Water Plant, which discharges into Rivera Drain and then to New River, and drainage water coming from the Colorado River District system of canals that enter the New River below Laguna Xochimilco.

RECORDS: Records of the Potable Water Plant are based on flows measured on a Parshall flume less pumping to the city. Records obtained and furnished by the State Commission of Public Services of Mexicali. Records available: Wisteria Wasteway, January 1951 through 1975; Sifon Wasteway, January 1952 to April 30, 1964; Pueblo Nuevo Wasteway, January 1956 through 1965; and the Potable Water Plant, January 1968 through December 1990.

REMARKS: To obtain data for Sifon and Pueblo Nuevo Wasteways, see bulletins 1 to 6 (1960-1965); and for Wisteria Wasteway, bulletins 1 to 16 (1960-1975). For data on wastes from Potable Water Plant, see previous page of this bulletin.

MONTHLY DISCHARGE IN THOUSAND CUBIC METRES

MONTH	CURRENT YEAR 1990	PERIOD 1956 - 1990		
		AVERAGE	MAXIMUM	MINIMUM
January	171	1,119	10,803	7.8
February	132	790	8,981	7.8
March	134	571	3,219	26.8
April	109	517	3,940	19.9
May	120	346	1,450	11.2
June	110	448	6,994	0
July	149	667	12,644	0
August	171	648	5,103	0
September	109	492	3,966	25.9
October	124	650	4,285	10.4
November	117	675	4,668	0
December	104	1,059	10,720	0
Yearly	1,550	7,982	33,835	492

10-2540.05 SALTON SEA - ELEVATIONS OF WATER SURFACE

DESCRIPTION: Water-stage recorder and staff gage located on the western shore of the Salton Sea, 24.9 kilometres northwest of Westmorland, Imperial County, California. The Salton Sea is the sink of a closed basin which has a drainage area of 21,652 square kilometres. Zero of the gage is 76.2 metres below mean sea level, U. S. C. & G. S. datum.

RECORDS: Records of water surface elevations available from November 1904 through 1990. From January 1925 to October 22, 1951, once monthly records of elevations were collected by Imperial Irrigation District from a bench mark at Figtree John's Spring, about 35.4 kilometres northwest along the western shore from the present gage. Since October 24, 1951, a continuous record of gage heights has been obtained by the U. S. Geological Survey at new gaging station published as "Salton Sea near Westmorland, California." The elevation of the old station is at a datum of 0.30 metre higher than that of the present station. All records reported below and the area and capacity table are adjusted to the datum of the present station.

REMARKS: Runoff from the basin, irrigation drainage and waste water from Imperial and Coachella Valleys in the United States, and drainage and waste water from part of the Mexicali Valley in Mexico discharge into the Salton Sea. Water from Mexico enters the United States in the Alamo and New River channels. The bottom of the sea is 84.6 metres below mean sea level, U. S. C. & G. S. datum.

EXTREMES: Maximum elevation during year, 69.4 metres below mean sea level. Minimum elevation during year, 69.7 metres below mean sea level. Extremes for period of record, maximum elevation 59.7 below mean sea level February 10 to March 29, 1907; minimum elevation since 1906, 76.7 metres below mean sea level in November 1924.

MEAN DAILY WATER SURFACE ELEVATION IN METRES BELOW MEAN SEA LEVEL - 1990

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	69.62	69.56	69.52	69.43	69.43	69.46	69.49	69.56	69.65	69.68	69.71	69.74
2	69.62	69.56	69.52	69.43	69.43	69.46	69.49	69.56	69.65	69.68	69.71	69.74
3	69.62	69.56	69.52	69.43	69.43	69.46	69.49	69.56	69.65	69.68	69.71	69.74
4	69.62	69.56	69.52	69.43	69.40	69.46	69.49	69.56	69.65	69.68	69.74	69.74
5	69.62	69.56	69.52	69.43	69.40	69.46	69.49	69.56	69.65	69.68	69.74	69.74
6	69.62	69.56	69.49	69.43	69.40	69.46	69.49	69.56	69.65	69.68	69.74	69.74
7	69.62	69.56	69.49	69.43	69.40	69.46	69.49	69.56	69.65	69.68	69.74	69.74
8	69.62	69.56	69.49	69.43	69.40	69.46	69.49	69.56	69.65	69.71	69.74	69.71
9	69.62	69.56	69.49	69.43	69.40	69.46	69.49	69.56	69.65	69.71	69.74	69.71
10	69.62	69.56	69.49	69.43	69.40	69.46	69.49	69.56	69.65	69.71	69.74	69.71
11	69.62	69.56	69.49	69.43	69.43	69.46	69.49	69.56	69.65	69.71	69.74	69.71
12	69.62	69.56	69.49	69.43	69.43	69.46	69.49	69.56	69.65	69.71	69.74	69.71
13	69.62	69.56	69.49	69.43	69.43	69.46	69.49	69.56	69.65	69.71	69.74	69.71
14	69.62	69.56	69.49	69.40	69.43	69.46	69.49	69.56	69.65	69.71	69.74	69.71
15	69.62	69.56	69.49	69.40	69.43	69.46	69.49	69.56	69.65	69.71	69.74	69.71
16	69.62	69.56	69.49	69.40	69.43	69.46	69.49	69.56	69.65	69.71	69.74	69.71
17	69.59	69.56	69.49	69.40	69.43	69.49	69.49	69.56	69.68	69.71	69.74	69.71
18	69.59	69.56	69.49	69.40	69.43	69.49	69.49	69.59	69.68	69.71	69.74	69.71
19	69.59	69.56	69.49	69.40	69.43	69.49	69.49	69.59	69.68	69.71	69.74	69.71
20	69.59	69.56	69.49	69.40	69.43	69.49	69.49	69.59	69.68	69.71	69.74	69.71
21	69.59	69.56	69.46	69.40	69.43	69.49	69.49	69.62	69.68	69.71	69.74	69.71
22	69.59	69.56	69.46	69.40	69.43	69.49	69.52	69.62	69.68	69.71	69.74	69.71
23	69.59	69.56	69.46	69.40	69.43	69.49	69.52	69.62	69.68	69.71	69.74	69.71
24	69.59	69.56	69.46	69.40	69.43	69.49	69.52	69.62	69.68	69.71	69.74	69.71
25	69.59	69.52	69.46	69.40	69.43	69.49	69.52	69.62	69.68	69.71	69.74	69.71
26	69.59	69.52	69.43	69.40	69.46	69.49	69.52	69.62	69.68	69.71	69.74	69.71
27	69.59	69.52	69.43	69.40	69.46	69.49	69.52	69.62	69.68	69.71	69.74	69.71
28	69.59	69.52	69.43	69.40	69.46	69.49	69.52	69.62	69.68	69.71	69.74	69.71
29	69.59	69.52	69.43	69.43	69.46	69.49	69.56	69.62	69.68	69.71	69.74	69.71
30	69.59	69.52	69.43	69.43	69.46	69.49	69.56	69.65	69.68	69.71	69.74	69.71
31	69.59	69.52	69.43	69.43	69.46	69.49	69.56	69.65	69.68	69.71	69.74	69.71
Avg.	69.61	69.55	69.48	69.41	69.43	69.47	69.50	69.59	69.66	69.70	69.74	69.72

Current Year 1990			Period 1935-1990		
Month	Extreme Elevation Metres		Elevation Metres		
	High	Low	# Average	# Maximum	# Minimum
Jan.	69.59	69.62	71.74	69.31	75.99
Feb.	69.52	69.56	71.65	69.22	75.83
Mar.	69.43	69.52	71.57	69.19	75.77
April	69.40	69.43	71.52	69.16	75.80
May	69.40	69.46	71.51	69.13	75.74
June	69.46	69.49	71.56	69.19	75.83
July	69.49	69.56	71.61	69.22	75.93
Aug.	69.56	69.65	71.66	69.25	76.02
Sept.	69.65	69.68	71.72	69.28	76.02
Oct.	69.68	69.71	71.75	69.31	76.14
Nov.	69.71	69.74	71.76	69.34	76.20
Dec.	69.71	69.74	71.72	69.34	76.08
Yearly	69.40	69.74	71.65	69.22	76.20

* Mean daily

Mean monthly

! Reading near first day of month

Area and Capacity Table		
Elevation	Area	Capacity
Metres Below M.S.L.	Hectares	Thousand Cubic Metres
84.64	0	0
83.52	8,337	31,700
82.30	25,455	232,800
81.08	38,284	629,800
79.25	49,615	1,443,000
78.03	59,512	2,077,000
76.81	60,218	2,775,000
75.15	72,723	4,394,000
73.15	79,683	5,322,000
71.63	89,760	6,611,000
70.10	95,426	8,023,000
67.06	106,029	11,093,000
67.01	116,753	14,481,000
60.96	127,680	18,206,000

CHEMICAL ANALYSES OF WATER SAMPLES

The tables below are based on samples collected and analyzed by the State of California Department of Water Resources. New River samples prior to 1985 collected and analyzed by the U. S. Geological Survey. Beginning December 1971, not all constituents analyzed.

Samples from the Alamo River are taken north of the international boundary at upstream end of box culvert under the All-American Canal. Flow at this point includes drainage flows across international boundary and flows from drain intercepts along toe of south bank of All-American Canal. Samples from New River are taken from the right bank at road bridge 137 metres north of international boundary. Records of sampling extend from April 1951 through 1990.

ALAMO RIVER

1990 Date	Time Std.	Streamflow Momentary m3/sec	Specific Conductance Micromhos	pH Units	Hardness, Total (as CaCO ₃) mg/L	Sulfate ion (SO ₄) Dissolved mg/L	Chloride ion (Cl) Dissolved mg/L	Solids Dissolved (Calculated) mg/L
Mar. 13	1400	6.17	3800	7.8	876	619	995	2860
June 10	0600	4.67	3700	7.4	870	398	974	2702

NEW RIVER

1990 Date	Time Std.	Streamflow Momentary m3/sec	Specific Conductance Micromhos	pH Units	Hardness, Total (as CaCO ₃) mg/L	Sulfate ion (SO ₄) Dissolved mg/L	Chloride ion (Cl) Dissolved mg/L	Solids Dissolved (Calculated) mg/L
Mar. 13	1530	0.14	4130	8.2	934	1000	960	3490
June 10	0800	0.23	3600	7.8	891	606	820	2900

SPECIFIC CONDUCTANCE OF WATER SAMPLES

The following table shows specific conductance of individual water samples from the New River in Mexico at the international boundary. Samples were taken by the Mexican Section of the Commission, who also made the determinations.

NEW RIVER AT INTERNATIONAL BOUNDARY

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

January		March		May		July		September		November	
3	5,000	7	5,200	2	11,100	4	6,000	5	5,600	7	5,300
10	5,000	14	5,700	9	7,000	11	6,200	12	6,000	14	5,800
17	5,800	21	5,900	16	7,100	18	6,500	19	6,000	21	5,500
24	4,500	28	5,800	23	7,200	25	6,800	26	6,200	28	6,100
31	4,900	April		30	5,400	August		October		December	
February		4	5,800	June		1	6,400	3	5,300	5	5,400
7	5,200	11	6,200	6	5,400	8	6,100	10	5,800	12	5,500
14	5,000	18	6,200	13	6,400	15	6,000	17	5,400	19	5,300
21	5,100	25	6,800	20	5,800	22	5,200	24	5,500	26	4,900
28	5,100			27	5,900	29	5,400	31	5,500		

11-0100.00 COTTONWOOD CREEK ABOVE MORENA DAM, CALIFORNIA

DESCRIPTION: Staff gage located on east side of outlet tower immediately upstream from face of Morena Dam. The dam is located on Cottonwood Creek 2.9 kilometres upstream from the mouth of Hauser Creek, 13.7 kilometres upstream from Barrett Dam, and about 32 kilometres upstream from the international boundary. The zero of the gage is 878.56 metres above mean sea level, U. S. C. & G. S. datum.

RECORDS: Reservoir inflows shown below were computed from monthly reservoir records of storage, releases, spills, leakage, evaporation, and rainfall, by the International Boundary and Water Commission, United States Section. They represent all water reaching Morena Reservoir, including rainfall on reservoir, water surface. Basic data were furnished by the city of San Diego, California. Records April 1911 through 1990.

REMARKS: Storage began in Morena Reservoir March 1910. Reservoir capacity and area ratings date from 1910 when Morena Dam was completed. Records for 1990 computed on basis of area-capacity curves determined from 1948 resurvey. Various changes have been made to the spillway section since construction of the dam. Elevation of the present crest of ungated spillway is 47.85 metres, gage datum. Reservoir capacity at spillway crest, 1948 survey, is 61,934,000 m³. The entire capacity of Morena Reservoir is used to furnish a part of the water supply of the city of San Diego, California. Water is released from Morena Reservoir down Cottonwood Creek to Barrett Reservoir as required.

EXTREMES: Maximum monthly inflow since 1937, 55,845,000 m³, March 1983. Prior to 1937, maximum monthly inflow, 45,886,000 m³, January 1916; minimum no flow during parts of many years.

MONTHLY DISCHARGE IN THOUSAND CUBIC METRES

MONTH	CURRENT YEAR 1990	PERIOD 1937 - 1990		
		AVERAGE	MAXIMUM	MINIMUM
January	31.8	844	9,217	0
February	117	2,453	41,407	9.9
March	93.5	3,612	55,845	23.8
April	132	2,045	28,530	4.1
May	80.4	1,030	18,642	0
June	89.7	578	10,173	0
July	77.5	364	7,651	0
August	26.8	310	8,916	0
September	36.4	209	6,331	0
October	32.3	190	4,817	0
November	32.2	313	5,633	0
December	70.8	825	9,472	5.4
Yearly	820	12,773	177,579	149

WESTERN BOUNDARY WATER BULLETIN - 1990 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

11-0105.00 COTTONWOOD CREEK BELOW MORENA DAM, CALIFORNIA

DESCRIPTION: Two water-stage recorders, one on the upstream side of the southeast abutment of Morena Dam for measuring head on the spillway crest and one immediately below the dam with a rectangular control weir for measuring ordinary reservoir releases, and cableway located about 1.3 kilometres downstream from the dam. Discharge measurements made at the cableway include leakage, controlled releases, and spillway discharges.

RECORDS: Monthly records shown below represent the water available immediately below Morena Dam, consisting of spillway waste, draft, and leakage from the dam. They are computed by the International Boundary and Water Commission, United States Section, from basic data furnished by the city of San Diego, California. Records available: January 1911 through 1990.

REMARKS: Flows at this station are regulated by Morena Dam; storage began March 1910. Water is released from Morena Reservoir as required and flows down the natural channel of Cottonwood Creek to Barrett Reservoir. There are no major diversions above Morena dam.

EXTREMES: Maximum monthly discharge since 1937, 55,615,000 m³, March 1983. Prior to 1937, maximum monthly discharge, 26,397,000 m³, February 1916; minimum, no flow during several months of various years.

MONTHLY DISCHARGE IN THOUSAND CUBIC METRES

MONTH	CURRENT YEAR 1990	PERIOD 1937 - 1990		
		AVERAGE	MAXIMUM	MINIMUM
January	27.1	267	2,583	0
February	42.2	1,056	19,644	0
March	5,829	2,204	55,615	0
April	24.3	1,678	28,159	0
May	25.0	894	18,100	0
June	22.4	657	9,260	0
July	23.2	371	6,236	0
August	23.2	353	7,937	0
September	22.4	404	7,253	0
October	23.2	223	4,639	0
November	22.4	261	5,071	0
December	23.2	532	9,099	0
Yearly	6,108	8,900	168,432	0

11-0110.00 COTTONWOOD CREEK ABOVE BARRETT DAM, CALIFORNIA

DESCRIPTION: Staff gage located immediately upstream from face of dam on west side of outlet tower. Barrett Dam is located on Cottonwood Creek 13.7 kilometres downstream from Morena Dam, 1.6 kilometres downstream from the mouth of Pine Valley Creek, and about 19.3 kilometres upstream from the international boundary. Zero of gage is 440.78 metres above mean sea level, U. S. C. & G. S. datum.

RECORDS: Records reported below represent all water reaching Barrett Dam from the sub-basin below Morena Dam, including rainfall on the reservoir water surface. Leakage, releases, and spills from Morena Reservoir are not included. The inflows were computed from monthly reservoir records of storage, releases, spills, leakage evaporation, and rainfall furnished by the city of San Diego, California. Records available: January 1921 through 1990. Records of stream flow for a station at the dam site are also available for the periods 1906-1915 and 1917-1920.

REMARKS: Storage began at Barrett Reservoir in January 1921. The area-capacity-elevation curves used in the inflow calculations are dated 1948, 1951, and 1955 and were furnished by the city of San Diego, California. Capacity of reservoir at top of flash gates on spillway (gage height 51.47 metres) is 55,205,000 m³. Capacity at spillway crest (gage height 49.04 metres) is 46,811,000 m³. Dead storage, 887,000 m³ below lowest outlet (gage height 17.95 metres) is included in these capacities. The entire capacity of Barrett Reservoir is used to furnish a part of the water supply of the city of San Diego, California.

EXTREMES: Maximum monthly discharge since 1937, 67,540,000 m³, February 1980. Prior to 1937, maximum monthly discharge, 67,595,000 m³ February 1927; minimum, no flow during several months of various years.

MONTHLY DISCHARGE IN THOUSAND CUBIC METRES

MONTH	CURRENT YEAR 1990	PERIOD 1937 - 1990		
		AVERAGE	MAXIMUM	MINIMUM
January	206	999	6,076	6.4
February	122	3,229	67,539	9.4
March	98.7	5,154	56,370	17.4
April	86.1	2,472	26,680	12.6
May	0	1,056	10,251	0
June	0	484	4,818	0
July	0	230	2,081	0
August	0	142	735	0
September	0	147	936	0
October	0	120	796	0
November	64.1	224	1,531	0
December	71.0	662	6,845	2.1
Yearly	648	14,919	141,024	159

11-0114.90 DULZURA CONDUIT BELOW BARRETT DAM, CALIFORNIA

DESCRIPTION: Water-stage recorder 0.8 kilometre downstream from Barrett Dam on right bank of Dulzura Conduit 15.2 metres upstream from road crossing to Barrett Dam. Elevation of gage has not been determined.

RECORDS: Computed on basis of head on control section of flume, as measured by water-stage recorder, and rating curve determined from current meter measurements. Records obtained and furnished by the city of San Diego, California. Records available: January 1909 through 1990.

REMARKS: Barrett Dam was completed in 1921. Prior to this date the intake of Dulzura Conduit was located 2.4 kilometres upstream. The conduit carries diversions from Barrett Reservoir on Cottonwood Creek westerly across the divide into Otay Reservoir for municipal use by the city of San Diego. Prior to September 30, 1958, station was located 12.9 kilometres along the conduit from Barrett Dam, being reported as "Dulzura Conduit near Dulzura," and the draft from Barrett Reservoir was computed from the discharges obtained at the conduit gaging station, multiplied by the factor 1.05 to allow for channel loss in the reach from the reservoir to the gaging station.

EXTREMES: Since 1937: Maximum mean daily discharge, 1.56 m³/sec on March 15, 1954; minimum discharge, no flow for long periods on many occasions.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0.46	0.55	0.39	0.44	0.46	0.40	0.07	0
2	0	0	0	0	.46	.54	.55	.44	.46	.40	.07	0
3	0	0	0	0	.46	.54	.55	.44	.46	.39	.06	0
4	0	0	0	0	.46	.54	.52	.44	.46	.39	.05	0
5	0	0	0	0	.44	.54	.52	.43	.44	.37	.05	0
6	0	0	0	0	.44	.54	0	.43	.44	.37	.05	0
7	0	0	0	0	.45	.54	.21	.43	.44	.37	0	0
8	0	0	0	0	.46	.54	.44	.43	.44	.35	0	0
9	0	0	0	0	.46	.54	.43	.42	.44	.35	0	0
10	0	0	0	.11	.46	.53	.55	.42	.42	.35	0	0
11	0	0	0	.22	.46	.53	.55	.42	.42	.33	0	0
12	0	0	0	.36	.44	.52	.54	.42	.40	.33	0	0
13	0	0	0	.43	.44	.52	.54	.42	.40	.33	0	0
14	0	0	0	.52	.44	.52	.54	.42	.40	.33	0	0
15	0	0	0	.52	.44	.52	.53	0	.40	.33	0	0
16	0	0	0	.52	.46	.58	.52	0	.40	.39	0	0
17	0	0	0	.52	.45	.58	0	0	.40	.39	0	0
18	0	0	0	.54	.45	.58	0	0	.40	.39	0	0
19	0	0	0	.55	.44	.58	0	0	.46	.37	0	0
20	0	0	0	.56	.44	.58	0	0	.44	.27	0	0
21	0	0	0	.57	.44	.58	0	0	.44	.27	0	0
22	0	0	0	.57	.44	.58	0	0	.44	.22	0	0
23	0	0	0	.57	.44	.61	0	0	.43	.18	0	0
24	0	0	0	.57	0	.62	0	0	.43	.15	0	0
25	0	0	0	.57	0	.63	0	.15	.42	.15	0	0
26	0	0	0	.56	.49	.63	0	.27	.42	.14	0	0
27	0	0	0	.55	.50	0	0	.27	.41	0	0	0
28	0	0	0	.54	.50	0	.10	.27	.41	0	0	0
29	0	0	0	.55	.50	0	.37	.39	.40	.08	0	0
30	0	0	0	.58	.50	.14	.36	.39	.40	.08	0	0
31	0	0	0	.50	.50	.44	.39	.39	.40	.08	0	0
Sum	0	0	0	10.59	13.32	14.70	8.65	8.13	12.78	8.55	0.35	0
Current Year 1990												
Period 1937-1990												
Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres				
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum	
Jan.	1	1	1	0	1	0	0	0	512	2,899	0	0
Feb.	1	1	1	0	1	0	0	0	538	2,627	0	0
Mar.	1	1	1	0	1	0	0	0	704	2,874	0	0
April	30	.58	1	1	0	.35	915	999	3,528	0	0	0
May	127	.50	124	0	.43	1,151	1,141	3,750	0	0	0	0
June	125	.63	127	0	.49	1,270	1,216	3,602	0	0	0	0
July	12	.55	117	0	.28	747	1,060	3,602	0	0	0	0
Aug.	1	.44	115	0	.26	702	988	3,478	0	0	0	0
Sept.	1	.46	112	.40	.43	1,104	824	2,826	0	0	0	0
Oct.	1	.40	127	0	.28	739	685	3,022	0	0	0	0
Nov.	1	.07	17	0	.01	30.2	688	3,404	0	0	0	0
Dec.	1	0	11	0	0	0	620	2,843	0	0	0	0
Yearly				0.63		0	0.21	6,658	9,975	33,514	0	0

♦ Mean daily

! And other days

11-0111.00 COTTONWOOD CREEK BELOW BARRETT DAM, CALIFORNIA

DESCRIPTION: Water-stage recorder and cableway located about 4.0 kilometres downstream from Barrett Dam and 0.8 kilometre upstream from Rattlesnake Canyon for measuring Barrett Dam spills; and staff gage and control weir located immediately below the dam for measuring leakage. The elevation of the gage is about 305 metres (from topographic map).

RECORDS: Data furnished by the city of San Diego, California. Prior to January 1953, the records were furnished by the city of San Diego and reviewed and revised by the United States Section of the Commission. The recorder is to be operated only when Barrett Reservoir is near or above spillway level. Spillway discharges have occurred in May 1943, March, April 1979, January to May of 1980, April, December 1982, and the entire year of 1983. Spillway discharges included in the period record below were computed by the city of San Diego from the head on the spillway crest, read on the reservoir gage, and applied to a broad-crested weir formula. Records available: January 1921 through 1990. Storage began in Barrett Reservoir in January 1921.

REMARKS: Records reported below represent the water available in the natural channel of Cottonwood Creek immediately below Barrett Dam. Records of draft from Barrett Reservoir are not included, inasmuch as all releases are made to Dulzura Conduit, which transports water outside the basin. Leakage is mainly through the spillway gates.

EXTREMES: Maximum monthly discharge since 1937, 111,775,000 m³ March 1983. Prior to 1937, maximum monthly discharge 47,366,000 m³, February 1927; minimum, no flow during several months of various years.

MONTHLY DISCHARGE IN THOUSAND CUBIC METRES

MONTH	CURRENT YEAR 1990	PERIOD 1937 - 1990		
		AVERAGE	MAXIMUM	MINIMUM
January	0	231	7,460	0
February	0	2,162	86,736	0
March	0	4,148	111,775	0
April	0	2,364	45,417	0
May	0	1,001	28,287	0
June	0	456	13,503	0
July	0	169	5,311	0
August	0	114	4,206	0
September	0	10.4	368	0
October	0	4.5	152	0
November	0	95.7	5,100	0
December	0	147	6,058	0
Yearly	0	10,903	254,099	0

11-0120.00 COTTONWOOD CREEK ABOVE TECATE CREEK NEAR DULZURA, CALIFORNIA

DESCRIPTION: Water-stage recorder and cableway located 2.6 kilometres upstream from the international land boundary between the United States and Mexico, 1.3 kilometre upstream from the confluence with Tecate Creek, and 8.2 kilometres south of Dulzura, California. Low water discharge measurements are made by wading at the gage; high water measurements are made from the cableway, which is located 213 metres downstream from the gage. Zero of the gage is 173.55 metres above mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on a continuous record of gage heights and current meter measurements or observation of no flow. Records obtained and furnished by the U. S. Geological Survey. Records available: October 1936 through 1990.

REMARKS: Flow is largely controlled by Barrett and Morena Reservoirs, 16.1 kilometres and 29.0 kilometres, respectively, upstream from this station.

EXTREMES: Maximum discharge 331 m³/sec February 21, 1980 (gage height 3.40 metres). Minimum discharge, no flow during part of each year.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0

Current Year 1990

Period 1937-1990

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	High	Low	Day	φ High	Day	φ Low		Total	Average	Maximum	Minimum
Jan.			1 1	0	1 1	0	0	0	594	14,701	0
Feb.			1 1	0	1 1	0	0	0	2,820	85,134	0
Mar.			1 1	0	1 1	0	0	0	4,536	109,418	0
April			1 1	0	1 1	0	0	0	2,722	49,635	0
May			1 1	0	1 1	0	0	0	981	22,439	0
June			1 1	0	1 1	0	0	0	325	7,301	0
July			1 1	0	1 1	0	0	0	87.0	3,599	0
Aug.			1 1	0	1 1	0	0	0	68.4	1,850	0
Sept.			1 1	0	1 1	0	0	0	17.3	796	0
Oct.			1 1	0	1 1	0	0	0	9.3	291	0
Nov.			1 1	0	1 1	0	0	0	50.6	1,378	0
Dec.			1 1	0	1 1	0	0	0	201	3,169	0
Yearly				0		0	0	0	12,412	220,556	0

φ Mean daily

! And other days

11-0125.00 CAMPO CREEK NEAR CAMPO, CALIFORNIA

DESCRIPTION: Water-stage recorder and broad-crested weir on left bank, 0.8 kilometre upstream from the international land boundary between the United States and Mexico, just upstream from the bridge on California State Highway 94, 5.6 kilometres southwest of Campo, California. Zero of gage is 664.13 metres above mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on current meter measurements and observation of no flow. Records obtained and furnished by the U. S. Geological Survey from October 1936 to September 1990. Records since October 1990 furnished by United States section of the Commission. Records available: October 1936 through 1990.

REMARKS: Campo Creek originates in the United States and flows southwestward into Mexico where it joins Tecate Creek. The flow at this station was partially regulated by a small conservation reservoir, 1.6 kilometre upstream, from August 1956 to February 20, 1980, when it was destroyed by a flood.

EXTREMES: Maximum discharge, 25.3 m³/sec, March 24, 1983 (gage height 1.64 metres present datum), from rating curve extended from rating curve extended above 3.12 m³/sec on basis of velocity-depth relation and cross section area at the control. Minimum discharge, no flow during part of most years.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.01	0.01	0	0.01	0	0	0	0	0	0	0	0
2	.01	0	0	0	0	0	0	0	0	0	0	0
3	.01	0	.01	0	0	0	0	0	0	0	0	0
4	.01	.01	.01	0	0	0	0	0	0	0	0	0
5	.01	.01	.01	0	0	0	0	0	0	0	0	0
6	.01	0	.01	0	0	0	0	0	0	0	0	0
7	.01	0	.01	0	0	0	0	0	0	0	0	0
8	.01	.01	.01	0	0	0	0	0	0	0	0	0
9	.01	0	.01	0	0	0	0	0	0	0	0	0
10	.01	0	.01	0	0	0	0	0	0	0	0	0
11	.01	0	.01	0	0	0	0	0	0	0	0	0
12	.01	0	.01	0	0	0	0	0	0	0	0	0
13	.01	0	.01	0	0	0	0	0	0	0	0	0
14	.01	0	.01	0	0	0	0	0	0	0	0	0
15	.01	0	.01	0	0	0	0	0	0	0	0	0
16	.01	0	0	0	0	0	0	0	0	0	0	0
17	.01	.01	.01	.01	0	0	0	0	0	0	0	0
18	.01	.01	.01	.01	0	0	0	0	0	0	0	0
19	.01	.01	0	.01	0	0	0	0	0	0	0	0
20	.01	0	.01	.01	0	0	0	0	0	0	0	.01
21	0	0	0	.01	0	0	0	0	0	0	0	.01
22	0	0	0	.01	0	0	0	0	0	0	0	0
23	0	0	0	.01	0	0	0	0	0	0	0	0
24	0	0	0	.01	0	0	0	0	0	0	0	0
25	0	0	0	.01	0	0	0	0	0	0	0	0
26	0	0	0	.01	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	.01	0	0	0	0	0	0	0	0	0
29	0	.01	.01	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
31	.01	.01	.01	0	0	0	0	0	0	0	0	0
Sum	0.21	0.07	0.19	0.11	0	0	0	0	0	0	0	0.02
Current Year 1990										Period 1937-1990		
Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres				
	High	Low	Day	φ High	Day	φ Low		Total	Average	Maximum	Minimum	
Jan.			1	0.01	121	0	0.01	18.1	221	1,341	0	
Feb.			1	.01	12	0	0	6.0	439	5,288	0	
Mar.			3	.01	1	0	.01	16.4	730	11,587	0	
April			1	.01	12	0	0	9.5	498	8,886	0	
May			1	0	1	0	0	0	235	3,956	0	
June			1	0	1	0	0	0	112	2,234	0	
July			1	0	1	0	0	0	65.7	1,525	0	
Aug.			1	0	1	0	0	0	67.1	2,008	0	
Sept.			1	0	1	0	0	0	48.7	1,214	0	
Oct.			1	0	1	0	0	0	58.5	1,084	0	
Nov.			1	0	1	0	0	0	112	1,522	0	
Dec.			120	.01	1	0	0	1.7	181	1,953	0	
Yearly				0.01		0	0	51.7	2,768	38,639	0	

♦ Mean daily

! And other days

11-0130.00 COTTONWOOD CREEK NEAR INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder and cableway, 1.0 kilometre upstream from the international land boundary between the United States and Mexico, 0.8 kilometre downstream from the confluence of Cottonwood Creek and Tecate Creek, and 8.9 kilometres south of Dulzura, California. This station is published by the U. S. Geological Survey under the name "Tijuana River near Dulzura, California." Low water discharge measurements are made by wading at the gage. The zero of the gage is 165.33 metres above mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on a continuous record of gage heights and current meter measurements or observation of no flow. Records obtained and furnished by the U. S. Geological Survey from October 1936 to September 1990. Records since October 1990 furnished by United States Section of the Commission. Records available: October 1936 through 1990.

REMARKS: Flow is partially controlled by Barrett and Morena Reservoirs, 17.7 kilometres and 30.6 kilometres, respectively, upstream from this station. The flow at this station represents the amount of water passing the Marron Dam site.

EXTREMES: Maximum discharge, 385 m³/sec, March 3, 1983, gage height 2.14 metres; maximum gage height, 3.41 metres February 18, 1980; minimum discharge, no flow for part of most years.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.07	0.08	0.07	0.07	0.04	0.03	0.02	0.03	0.03	0.03	0.03	0.03
2	.06	.07	.07	.07	.05	.03	.02	.03	.03	.03	.03	.03
3	.06	.07	.07	.07	.04	.03	.02	.03	.03	.03	.03	.03
4	.07	.08	.08	.07	.04	.02	.02	.03	.03	.03	.03	.03
5	.07	.07	.09	.06	.04	.02	.02	.03	.03	.03	.03	.03
6	.07	.07	.08	.06	.04	.02	.02	.03	.03	.03	.03	.03
7	.07	.07	.08	.05	.04	.02	.02	.03	.03	.03	.03	.03
8	.07	.06	.08	.05	.04	.02	.02	.03	.03	.03	.03	.03
9	.07	.06	.08	.05	.04	.02	.02	.03	.03	.03	.03	.03
10	.07	.06	.08	.04	.05	.02	.02	.03	.03	.03	.03	.03
11	.07	.07	.12	.04	.04	.02	.02	.03	.03	.03	.03	.03
12	.07	.07	.11	.04	.04	.02	.02	.03	.03	.03	.03	.03
13	.08	.07	.10	.04	.03	.02	.02	.03	.03	.03	.03	.03
14	.14	.07	.09	.04	.03	.02	.02	.03	.03	.03	.03	.03
15	.09	.07	.08	.05	.03	.02	.02	.03	.03	.03	.03	.03
16	.11	.07	.08	.05	.03	.02	.02	.03	.03	.03	.03	.03
17	.16	.10	.07	.06	.03	.02	.02	.03	.03	.03	.03	.03
18	.10	.14	.07	.08	.03	.02	.03	.03	.03	.03	.03	.03
19	.09	.09	.07	.05	.03	.02	.03	.03	.03	.03	.03	.03
20	.08	.07	.07	.06	.03	.02	.03	.03	.03	.03	.03	.03
21	.08	.06	.07	.05	.04	.02	.03	.03	.03	.03	.03	.03
22	.07	.05	.06	.04	.03	.02	.03	.03	.03	.03	.03	.03
23	.07	.05	.06	.06	.03	.02	.03	.03	.03	.03	.03	.03
24	.07	.05	.06	.10	.03	.02	.03	.03	.03	.03	.03	.03
25	.07	.05	.06	.06	.03	.02	.03	.03	.03	.03	.03	.03
26	.07	.05	.07	.05	.03	.02	.03	.03	.03	.03	.03	.03
27	.07	.06	.08	.05	.05	.02	.03	.03	.03	.03	.03	.03
28	.07	.06	.08	.05	.06	.02	.03	.03	.03	.03	.03	.03
29	.07	.07	.05	.04	.02	.03	.03	.03	.03	.03	.03	.03
30	.07	.07	.04	.04	.02	.03	.03	.03	.03	.03	.03	.03
31	.14	.07	.07	.03	.03	.03	.03	.03	.03	.03	.03	.03
Sum	2.52	1.94	2.39	1.65	1.15	0.63	0.76	0.93	0.90	0.93	0.90	0.93

Current Year 1990

Period 1937-1990

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Volume-Thousands of Cubic Metres				
	High	Low	Day	φ High	Day	φ Low	Average	Total	Average	Maximum	Minimum
Jan.			17	0.16	12	0.06	0.08	218	1,235	25,647	0
Feb.			18	.14	122	.05	.07	168	5,290	176,987	0
Mar.			11	.12	122	.06	.08	206	7,895	164,275	0
April			24	.10	110	.04	.06	143	3,768	62,981	0
May			28	.06	113	.03	.04	99.4	1,282	25,848	0
June			11	.03	14	.02	.02	54.4	453	10,396	0
July			18	.03	11	.02	.02	65.7	185	4,313	0
Aug.			11	.03	11	.03	.03	80.4	188	6,777	0
Sept.			11	.03	11	.03	.03	77.8	61.4	1,411	0
Oct.			11	.03	11	.03	.03	80.4	97.7	2,006	0
Nov.			11	.03	11	.03	.03	77.8	241	4,401	0
Dec.			11	.03	11	.03	.03	80.4	678	7,202	0
Yearly				0.16		0.02	0.04	1,351	21,374	355,880	0

φ Mean daily

! And other days

11-0131.00 INFLOWS TO RODRIGUEZ RESERVOIR, BAJA CALIFORNIA

DESCRIPTION: Rodriguez Dam is located in Mexico on Rio de las Palmas, the principal tributary to the Tijuana River, about 9.0 kilometres upstream from its confluence with Cottonwood Creek, 17.0 kilometres upstream from the point where the Tijuana River crosses the international boundary between the United States and Mexico, and 16.0 kilometres southeast of Tijuana, Baja California.

RECORDS: Computed from monthly reservoir records of storage, releases, spills, leakage, evaporation, and rainfall. Records obtained by the Ministry of Agriculture and Hydraulic Resources through May 1961; from June 1961 through March 1966 by the Junta de Agua Potable y Alcantarillado del Distrito Urbano de Tijuana, Baja California, and from April 1966 by the State of Baja California Commission of Public Services for Tijuana. Records furnished by the Mexican Section of the Commission. Records available: May 1937 through 1990. Storage began in Rodriguez Reservoir on September 22, 1936.

REMARKS: Records of runoff represent all water reaching Rodriguez Reservoir, including rainfall on the reservoir water surface. Area-capacity-elevation rating for reservoir used in the computations is dated 1927 when the reservoir area was initially surveyed. Elevation of crest of spillway 115.85 metres above mean sea level; at top of spillway gates 125.00 metres above mean sea level. Reservoir capacity at spillway crest 92,370,000 m³; at top of spillway gates 138,000,000 m³.

EXTREMES: Maximum monthly inflow, 194,216,000 m³; February 1980; minimum, no flow during part of most years.

MONTHLY DISCHARGE IN THOUSAND CUBIC METRES

MONTH	CURRENT YEAR 1990	PERIOD 1938 - 1990		
		AVERAGE	MAXIMUM	MINIMUM
January	130	2,536	67,620	0
February	81.8	7,114	194,216	7.2
March	41.9	12,098	172,556	5.2
April	20.0	3,801	95,953	0
May	3.3	747	14,136	0
June	4.6	243	5,749	0
July	0	116	1,806	0
August	42.2	75.8	950	0
September	.20	78.2	575	0
October	13.9	96.9	432	0
November	6.4	202	2,393	0
December	26.5	1,064	19,348	10.3
Yearly	371	28,172	381,515	313

11-0132.00 DIVERSIONS FROM RODRIGUEZ RESERVOIR, BAJA CALIFORNIA

DESCRIPTION: Sparling flow meter located immediately below the dam in the pipeline which carries water from Rodriguez Reservoir to Gate No. 1 (Poblado Presa) and to Gate No. 2 (City Aqueduct). Formerly, water for irrigation was also diverted to the North and South Canals.

RECORDS: Direct recording by Sparling flow meter. Records through May 1961 were obtained by the Ministry of Agriculture and Hydraulic Resources; from June 1961 to March 1966 by the Junta de Agua Potable y Alcantarillado del Distrito Urbano de Tijuana; and from April 1966 through 1990 by the State of Baja California Commission of Public Services for Tijuana. Records furnished by the Mexican Section of the Commission. Records available: May 1937 through 1990.

REMARKS: Beginning in January 1937, diversions for irrigation began from both sides for the Tijuana valley and for domestic use at the village by Rodriguez Dam and the city of Tijuana. Since February 1960, no water has been released for irrigation of farmlands.

EXTREMES: Maximum monthly diversion, 2,421,000 m³, July 1944; minimum, no flow on several occasions since March 1941.

MONTHLY DISCHARGE IN THOUSAND CUBIC METRES

MONTH	CURRENT YEAR 1990	PERIOD 1937 - 1990		
		AVERAGE	MAXIMUM	MINIMUM
January	0	453	1,969	0
February	0	455	1,763	0
March	0	527	1,990	0
April	0	637	1,976	0
May	0	792	2,067	0
June	0	875	2,290	0
July	0	923	2,421	0
August	0	853	2,293	0
September	0	734	1,884	0
October	0	652	1,996	0
November	0	547	1,928	0
December	0	511	1,969	0
Yearly	0	7,959	22,596	0

WESTERN BOUNDARY WATER BULLETIN - 1990 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

11-0133.00 TIJUANA RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder on top of north levee about 1.1 kilometre downstream (north) from boundary, 1.8 kilometres upstream from the new Dairy Mart Road bridge, and 2.3 kilometres west of the international gate at San Ysidro, California. Zero of the gage is at mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on current meter measurements, staff gage readings and record of gage heights. Records obtained and furnished by the United States Section of the Commission. Records available: May 1947 through 1990.

EXTREMES: Since May 1947: Maximum instantaneous discharge, 33,100 937 m³/sec, February 21, 1980; minimum discharge, no flow during many years since 1951.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.63	0.86	0.32	0.28	0.46	0.28	0.37	0.77	0.56	0.41	0.38	0.38
2	2.35	.71	.24	.52	.48	.27	.41	.88	.58	.41	.27	.29
3	.71	.65	.35	.58	.46	.27	.41	.88	.65	.47	.28	.28
4	.57	1.52	.41	.93	.45	.26	.37	.87	.74	.55	.32	.29
5	.50	.56	.56	.48	.40	.25	.36	.88	.75	.69	.40	.38
6	.51	.44	.54	.51	.37	.24	.42	1.07	.67	.53	.43	.33
7	.54	.42	.58	.50	.37	.24	.41	.74	.67	.66	.35	.37
8	.56	.48	.63	.46	.37	.24	.38	1.03	.80	.59	.33	.36
9	.62	.48	.53	.49	.40	.53	.37	1.01	.52	.51	.35	.43
10	.55	.46	.48	.56	.45	2.48	.36	.97	.52	.44	.33	.49
11	.50	.47	1.38	.53	.46	.36	.33	.97	.34	.43	.40	.41
12	.48	.49	.63	.53	.49	.33	.33	.88	.29	.40	.36	.57
13	.60	.54	.63	.48	.50	.33	.35	.52	.45	.40	.37	.48
14	2.69	.55	.54	.49	.46	.23	.43	.42	.33	.40	.34	.32
15	.89	.54	.48	.48	.36	.34	.41	.40	.33	.45	.35	.30
16	1.75	.56	.48	.50	.34	.45	.41	.41	.39	.47	.36	1.22
17	5.30	2.04	.57	.63	.37	.46	.44	.42	.46	.50	.38	.31
18	1.27	2.92	.50	.51	.36	.40	.46	.41	.45	.50	.37	.30
19	1.33	1.69	.50	.47	.33	.41	.47	.40	.57	.49	1.11	1.92
20	.88	.95	.62	.47	.34	.40	.51	.34	.53	.49	1.91	7.19
21	.79	.74	.64	.52	.31	.39	.55	.40	.63	.46	.51	1.04
22	.41	.74	.62	.49	.31	.40	.57	.47	.62	.46	.49	.61
23	.40	.66	.45	.52	.33	.60	.55	.47	.69	.48	.44	.57
24	.40	.62	.52	.51	.33	.47	.57	.50	.50	.47	.50	.52
25	.39	.61	.60	.46	.29	.52	.61	.37	.54	.43	.61	.37
26	.42	.58	.65	.47	.28	.46	.56	.36	.50	.48	.94	.41
27	.47	.52	.58	.48	.26	.46	.59	.41	.39	.44	.67	.38
28	.49	.41	.58	.53	.35	.49	.65	.43	.40	.37	.62	.43
29	.50		.46	.54	.24	.43	.69	.49	.44	.42	.59	.35
30	.51		.25	.54	.26	.39	.76	.50	.46	.43	.59	.35
31	2.39		.29		.26		.78	.54		.46		.40
Sum	30.40	22.21	16.61	15.46	11.44	13.38	14.88	19.21	15.77	14.69	15.35	22.05

Current Year 1990

Period 1947-1990

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Volume-Thousands of Cubic Metres				
	High	Low	Day	High		Low	Average	Total	Average	Maximum	Minimum
				Day	Day						
Jan.	12.83	11.93	17	13.9	21	0.19	0.98	2,627	3,469	89,355	0
Feb.	12.87	11.95	17	14.6	28	.36	.79	1,919	11,065	388,951	0
Mar.	12.56	11.92	11	9.18	2	.19	.54	1,435	14,763	362,019	0
April	12.37	11.95	4	5.92	1	.22	.52	1,336	3,933	77,633	0
May	12.02	11.93	28	.98	29	.22	.37	988	2,150	52,545	0
June	12.84	11.93	10	13.9	14	.17	.45	1,156	629	11,960	0
July	12.00	11.94	31	.82	12	.26	.48	1,286	480	11,400	0
Aug.	12.13	11.94	6	2.39	26	.26	.62	1,660	672	21,083	0
Sept.	12.06	11.94	8	1.31	12	.02	.53	1,363	190	1,363	0
Oct.	12.02	11.94	5	1.18	15	.31	.47	1,269	284	3,346	0
Nov.	12.65	11.93	19	10.7	1	.19	.51	1,326	570	5,399	0
Dec.	12.67	11.91	20	11.2	4	.17	.71	1,905	979	8,270	0
Yearly	12.87	11.91		14.6		0.02	0.58	18,270	39,184	734,832	0

! And other days

STORED WATER IN RESERVOIRS, TIJUANA RIVER BASIN

Data are presented below for all storage reservoirs in the Tijuana River Basin. The data represent contents on the last day of the month in thousands of cubic metres. The reservoir capacities indicated are total capacities at the top of the spillway gates in closed position on the controlled spillways of Barrett and Rodriguez Dams, and at spillway level for Morena Dam, which has had an uncontrolled spillway since the spillway gates were removed in 1942. The records of storage reported below for Morena, Barrett, and Rodriguez Reservoirs are based on the capacities as determined by the following surveys: Morena 1948; Barrett 1948, 1951, and 1955; and Rodriguez 1927, when the reservoir area was initially surveyed.

Records for Morena and Barrett Reservoirs are obtained and furnished by the city of San Diego and the U. S. Geological Survey. Records for Rodriguez Reservoir obtained and furnished by the State of Baja California Commission of Public Services for Tijuana.

IN THOUSANDS OF CUBIC METRES

Month	MORENA RESERVOIR, CALIFORNIA (Capacity 61,933)		BARRETT RESERVOIR, CALIFORNIA (Capacity 55,211)		RODRIGUEZ RESERVOIR, BAJA CALIFORNIA (Capacity 138,000)		TOTAL IN TIJUANA RIVER BASIN RESERVOIRS (Capacity 255,145)	
	1990	Average 1937-1990	1990	Average 1937-1990	1990	Average 1937-1990	1990	Average 1937-1990
Jan.	11,880	23,209	8,236	16,707	3,855	39,675	23,971	79,591
Feb.	11,964	24,446	8,353	17,895	3,890	41,174	24,207	83,515
Mar.	6,165	25,714	14,000	20,179	3,855	45,963	24,020	91,856
April	6,182	25,779	13,074	20,737	3,785	46,132	23,041	92,648
May	6,069	25,491	11,543	20,181	3,673	45,537	21,285	91,209
June	5,896	24,822	10,097	19,287	3,525	44,226	19,518	88,335
July	5,672	24,147	9,154	18,346	3,351	42,530	18,177	85,023
Aug.	5,453	23,562	8,196	17,380	3,194	40,872	16,843	81,814
Sept.	5,316	22,933	6,753	16,771	3,037	39,717	15,106	79,421
Oct.	5,184	22,556	5,816	16,189	2,949	38,459	13,949	77,204
Nov.	5,107	22,430	5,816	15,768	2,892	38,089	13,815	76,287
Dec.	5,135	22,597	5,871	16,090	2,857	38,421	13,863	77,108
Avg.	6,669	23,974	8,909	17,961	3,405	41,733	18,983	83,668
Max.	11,964	!# 76,069	14,000	!* 56,641	3,890	! 138,486	24,207	! 263,471
Min.	5,107	!! 12	5,816	!! 131	2,857	!! 0	13,815	!! 1,559

March 31, 1941 - Prior to removal of spillway gates

* April 30, 1937 - Sandbags were placed on crest of spillway

! Maximum end of month storage for period of record

!! Minimum end of month storage for period of record

RAINFALL ON THE TIJUANA RIVER WATERSHED
IN MILLIMETRES

Tabulated below are monthly records of rainfall with averages for their periods of record at stations located in California and Baja California. Daily records, where available, are on file in the offices of the United States and Mexican Sections of the Commission. For location, elevation, period of record, and the observer, see alphabetical listing of these stations following rainfall data.

IN THE UNITED STATES

Month	Morena Dam, California		Barrett Dam, California		Marron Valley, California		Sawday Ranch, California		Campo, California	
	1990	Average 1906-1990	1990	Average 1907-1990	1990	Average 1951-1990	1990	Average 1950-1990	1990	Average 1900-1990
Jan.	109	94	90	86	36	69	89	83	78	76
Feb.	56	93	58	85	#	55	56	74	45	80
Mar.	5	87	30	79	#	71	24	81	18	70
April	28	42	15	38	#	30	17	38	25	35
May	18	15	20	14	10	9	#	10	6	12
June	12	3	17	2	5	1	#	1	6	2
July	0	9	2	3	0	1	0	14	3	13
Aug.	5	14	0	6	0	3	7	20	5	14
Sept.	23	10	5	7	0	7	26	12	16	9
Oct.	0	23	1	18	0	10	4	15	1	16
Nov.	0	41	26	38	15	37	20	46	14	36
Dec.	43	79	47	72	38	58	41	62	33	62
Yearly	299	510	311	448		351		456	250	425

Month	Chula Vista, California		Lower Otay Dam, California		Brown Field, California					
	1990	Average 1930-1990	1990	Average 1906-1990	1990	Average 1964-1990				
Jan.	57	45	71	51	74	42				
Feb.	33	43	31	39	28	39				
Mar.	17	42	17	53	13	50				
April	13	21	13	27	21	25				
May	5	6	8	10	6	5				
June	15	1	33	2	20	2				
July	0	0	0	1	#	1				
Aug.	0	2	1	3	#	3				
Sept.	0	5	0	6	#	5				
Oct.	0	10	1	10	#	11				
Nov.	17	30	13	34	#	40				
Dec.	16	41	35	40	#	44				
Yearly	173	246	223	276		267				

IN MEXICO

Month	La Rumorosa, Baja California		Valle Redondo, Baja California		Tecate, Baja California		Rodriguez Dam, Baja California		Valle de Palmas, Baja California	
	1990	Average 1945-1990	1990	Average 1971-1990	1990	Average 1946-1959 1961-1990	1990	Average 1938-1990	1990	Average 1948-1990
Jan.	#	25	75	55	75	66	75	40	66	41
Feb.	#	16	#	57	44	48	27	36	21	30
Mar.	#	20	#	61	28	61	9	40	12	37
April	#	10	#	23	22	28	6	19	20	16
May	#	2	#	6	10	8	4	3	3	3
June	#	1	#	1	7	3	6	1	11	1
July	#	10	#	2	0	4	T	1	0	2
Aug.	#	18	#	4	2	6	3	3	0	5
Sept.	#	9	#	8	2	4	0	6	0	6
Oct.	#	9	#	19	7	12	T	10	0	8
Nov.	#	15	#	46	30	37	12	25	14	22
Dec.	#	20	#	44	47	52	20	39	26	29
Yearly		151		331	274	345	162	222	173	195

Missing record

T Trace

RAINFALL ON THE TIJUANA RIVER WATERSHED
IN MILLIMETRES

IN MEXICO

	P. B. Rosarito, Baja California		El Pinal, Baja California		El Hongo, Baja California		El Carrizo, Baja California		Belen, Baja California	
	1990	Average 1967-1990	1990	Average 1964-1990	1990	Average 1980-1990	1990	Average 1980-1990	1990	Average 1965-1990
Jan.	#	#	118	75	80	43	68	42	95	61
Feb.	#	#	68	83	39	48	19	44	34	64
Mar.	#	#	36	88	12	61	17	55	18	67
April	#	#	35	42	6	19	13	20	14	27
May	#	#	8	9	5	4	3	3	6	4
June	#	#	#	1	20	2	2	1	7	2
July	#	#	25	19	0	17	0	4	0	4
Aug.	#	#	33	23	0	26	4	4	0	7
Sept.	#	#	21	19	24	9	T	5	0	10
Oct.	#	#	#	16	0	16	T	21	0	16
Nov.	#	#	29	50	17	41	14	41	29	42
Dec.	#	#	47	71	26	32	30	44	38	50
Yearly				498	229	350	170	310	241	363

Missing Record

T Trace

LOCATION OF RAINFALL STATIONS ON THE TIJUANA RIVER WATERSHED

The precipitation records of the stations listed alphabetically below began on the date shown and extend through 1990.

IN THE UNITED STATES

NAME OF STATION	LATITUDE	LONGITUDE	Ø ELEV. (Metres)	RECORD BEGAN	OBSERVER
Barrett Dam, California	32° 41'	116° 40'	494.69	1907	City of San Diego
Brown Field, California	32° 34'	116° 59'	156.97	1964	City of San Diego
Campo, California	32° 38'	116° 28'	801.62	1877	County of San Diego
Chula Vista, California	32° 36'	117° 06'	2.74	1930	Chula Vista Fire Department
Lower Otay Dam, California	32° 37'	116° 56'	164.59	1906	City of San Diego
Marron Valley, California	32° 34'	116° 46'	167.64	1951	County of San Diego
Morena Dam, California	32° 41'	116° 31'	937.26	1906	City of San Diego
Sawday Ranch, California	32° 45'	116° 29'	975.36	1950	William Tulloch

IN MEXICO

NAME OF STATION	LATITUDE	LONGITUDE	Ø ELEV. (Metres)	RECORD BEGAN	OBSERVER
Belen, Baja California	32° 12'	116° 29'	555.04	1965	** S.A.R.H.
El Carrizo, Baja California	32° 29'	116° 42'	494.99	1980	S.A.R.H.
El Hongo, Baja California	32° 31'	116° 18'	960.12	1980	S.A.R.H.
El Pinal, Baja California	32° 11'	116° 17'	11349.96	1964	S.A.R.H.
La Rumorosa, Baja California	32° 33'	116° 03'	1232.00	1945	S.A.R.H.
P.B. Rosarito, Baja California	32° 19'	117° 02'	21.95	1967	S.A.R.H.
Rodriguez Dam, Baja California	32° 27'	116° 54'	120.09	1938	S.A.R.H.
Tecate, Baja California	32° 33'	116° 41'	480.06	1946	S.A.R.H.
Valle de Las Palmas, Baja California	32° 22'	116° 37'	280.11	1948	S.A.R.H.
Valle Redondo, Baja California	32° 31'	116° 45'	242.01	1971	S.A.R.H.

Ø Elevation above mean sea level

** Ministry of Agriculture and Hydraulic Resources

" Estimated from topographic maps

EVAPORATION IN THE TIJUANA RIVER BASIN IN MILLIMETRES

Tabulated below are records of evaporation observed at stations in California and at stations in Baja California, with averages for their periods of record. The stations in California are observed by Western Salt Company, city of San Diego, California, and the United States Section of the Commission; those in Baja California are observed by the Ministry of Agriculture and Hydraulic Resources of Mexico. For specific location of these stations, refer to data opposite same station name shown in "Location of Rainfall Stations on the Tijuana River Watershed" in this bulletin.

Types of pans used:

1. Barrett Reservoir: January 1921 through September 1926, square 0.91-metre by 0.91-metre by 0.46-metre deep floating pan. October 1926 through 1990, square 0.91-metre by 0.91-metre by 0.46-metre deep land pan set 0.38-metre in ground.
2. Morena Reservoir: October 1915 through December 1921, square 0.91-metre by 0.91-metre by 0.46-metre deep floating pan. January 1922 through August 1926 records are the average of evaporation in a square 0.91-metre by 0.91-metre by 0.46-metre deep floating pan and a land pan of the same dimensions. September 1926 through 1990, square 0.91-metre by 0.91-metre by 0.46-metre deep land pan set 0.38-metre in ground.
3. Lower Otay Dam: January 1950 through 1990, square 0.91-metre by 0.91-metre by 0.46-metre deep land pan set 0.38-metre in ground.

IN THE UNITED STATES

Month	Morena Dam, California		Barrett Dam, California		Lower Otay Dam, California			
	1990	Average 1916-1990	1990	Average 1921-1990	1990	Average 1950-1990		
Jan.	41	54	50	48	57	49		
Feb.	44	54	40	55	57	58		
Mar.	81	83	62	85	89	85		
April	101	118	81	118	117	118		
May	167	165	116	167	161	155		
June	230	213	154	205	170	176		
July	265	245	181	243	197	212		
Aug.	223	226	150	227	178	199		
Sept.	175	180	129	185	165	163		
Oct.	145	126	93	130	136	118		
Nov.	106	82	66	81	89	72		
Dec.	55	59	43	50	62	54		
Yearly	1,633	1,605	1,165	1,594	1,478	1,459		

IN MEXICO

Month	Rodriguez Dam, Baja California		Valle de las Palmas, Baja California		El Carrizo, Baja California		Valle Redondo, Baja California	
	1990	Average 1939-1942 1946-1990	1990	Average 1956-1990	1990	Average 1980-1990	1990	Average 1976-1990
Jan.	75	106	#	#	191	134	#	83
Feb.	60	110	#	#	112	117	#	82
Mar.	88	116	#	#	160	151	#	109
April	114	141	#	#	187	194	#	137
May	148	129	#	#	235	230	#	139
June	188	193	#	#	280	276	#	242
July	204	218	#	#	344	298	#	263
Aug.	166	200	#	#	269	275	#	242
Sept.	155	169	#	#	280	236	#	191
Oct.	143	140	#	#	250	200	#	132
Nov.	88	112	#	#	192	150	#	92
Dec.	77	88	#	#	229	128	#	69
Yearly	1,506	1,731			2,729	2,343		1,852

Missing record

TEMPERATURE IN THE TIJUANA RIVER BASIN
IN DEGREES CELSIUS

The maximum, minimum, and monthly average temperature observations for United States stations are from daily readings of thermometers generally exposed in a shelter located a few metres above sod-covered ground. The maximum and minimum temperatures shown for the stations in Mexico are from daily maximum and minimum thermometer observations, with maximum and minimum for their periods of record. For specific location, elevation, period of record, and the observer, refer to data opposite same station name as shown in "Location of Rainfall Stations on Tijuana River Watershed" in this bulletin.

IN THE UNITED STATES

Month	Barrett Dam, California				Campo, California				Chula Vista, California			
	1990			Average 1931- 1990	1990			Average 1951- 1990	1990			Average 1931- 1990
	Mean	Max.	Min.		Mean	Max.	Min.		Mean	Max.	Min.	
Jan.	9.6	29.4	-1.1	9.5	8.4	27.8	-6.1	8.6	13.6	28.3	3.3	11.8
Feb.	9.2	26.7	-4.4	10.5	7.8	26.1	-10.6	9.1	12.9	27.2	-1.7	12.6
Mar.	12.9	29.4	0	11.9	11.1	29.4	-3.9	10.0	15.3	27.8	4.4	13.2
April	16.1	31.1	7.2	14.4	14.4	32.2	1.7	12.1	17.3	27.8	10.6	14.7
May	16.1	34.4	5.0	17.0	14.4	32.8	-1.7	14.9	18.0	31.7	10.0	16.1
June	22.6	41.1	9.4	20.4	20.8	41.7	3.3	18.5	20.5	35.6	13.3	17.5
July	25.4	37.8	11.7	24.5	23.4	40.0	4.4	22.8	22.1	28.9	15.6	19.7
Aug.	23.4	37.8	10.0	24.5	21.4	38.3	2.2	22.8	22.0	27.8	15.0	20.5
Sept.	22.8	38.9	9.4	22.4	20.6	40.6	2.8	20.4	21.9	32.8	15.0	19.8
Oct.	19.4	35.0	5.6	17.9	17.4	35.0	0.6	16.0	20.4	35.0	10.6	17.5
Nov.	13.6	30.6	-0.6	13.3	11.6	31.1	-5.6	11.4	16.8	32.8	6.1	14.7
Dec.	9.2	27.2	-4.4	10.2	7.1	25.6	-8.3	8.8	13.3	28.9	0	12.6
Yearly	16.7	41.1	-4.4	16.4	14.9	41.7	-10.6	14.6	17.8	35.6	-1.7	15.9

IN MEXICO

Month	La Rumorosa, Baja California				Tecate, Baja California				Rodriguez Dam, Baja California			
	1990		1945-1990		1990		1946-1990		1990		1938-1990	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	#	#	27.0	-15.0	30.0	-1.0	38.0	-9.0	28.0	2.0	32.0	-3.0
Feb.	#	#	28.0	-12.0	27.0	-5.0	38.0	-8.0	28.0	0	34.0	0
Mar.	#	#	31.0	-9.0	30.0	0	36.0	-5.0	28.0	4.0	38.0	0
April	#	#	33.0	-5.0	32.0	5.0	39.0	-2.0	31.0	7.0	40.0	2.0
May	#	#	36.0	-3.0	40.0	4.0	42.0	2.0	39.0	8.0	39.0	3.0
June	#	#	45.0	1.0	44.0	10.0	44.0	0	40.0	12.0	42.0	8.0
July	#	#	41.0	4.0	39.0	10.0	46.0	2.0	38.0	14.0	40.0	8.0
Aug.	#	#	39.0	8.0	38.0	8.0	47.0	1.0	32.0	12.0	41.0	10.0
Sept.	#	#	40.0	1.0	43.0	9.0	46.0	2.0	38.0	10.0	43.0	8.0
Oct.	#	#	37.0	-4.0	37.0	7.0	41.0	-3.0	35.0	9.0	42.0	1.0
Nov.	#	#	35.0	-10.0	32.0	-1.0	36.0	-3.0	35.0	4.0	37.0	-1.0
Dec.	#	#	29.0	-12.0	27.0	-2.0	36.0	-5.0	32.0	-2.0	34.0	-3.0
Yearly			45.0	-15.0	44.0	-5.0	47.0	-9.0	40.0	-2.0	43.0	-3.0

Month	Valle de Palmas, Baja California				P.B. Rosarito, Baja California				El Pinal, Baja California			
	1990		1948-1990		1990		1967-1990		1990		1964-1990	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	30.0	-2.0	33.0	-11.0	#	#	#	#	23.0	-5.0	25.0	-16.0
Feb.	29.0	-5.0	37.0	-5.0	#	#	#	#	20.0	-9.0	27.0	-10.0
Mar.	30.0	0	38.0	-2.0	#	#	#	#	23.0	-3.0	29.0	-7.0
April	30.0	5.0	41.0	-2.0	#	#	#	#	25.0	3.0	29.0	-8.0
May	40.0	4.0	44.0	2.0	#	#	#	#	31.0	0	33.0	-4.0
June	46.0	8.0	48.0	4.0	#	#	#	#	#	#	43.0	-4.0
July	41.0	8.0	49.0	7.0	#	#	#	#	44.0	10.0	44.0	0
Aug.	39.0	9.0	48.0	5.0	#	#	#	#	44.0	6.0	44.0	0
Sept.	45.0	9.0	47.0	4.0	#	#	#	#	45.0	3.0	45.0	-4.0
Oct.	39.0	5.0	43.0	0	#	#	#	#	#	#	35.0	-5.0
Nov.	34.0	0	38.0	-7.0	#	#	#	#	34.0	-3.0	34.0	-10.0
Dec.	30.0	0	35.0	-6.0	#	#	#	#	29.0	-4.0	29.0	-4.0
Yearly	46.0	-5.0	49.0	11.0							45.0	-16.0

Missing record

TEMPERATURE IN THE TIJUANA RIVER BASIN
IN DEGREES CELSIUS

IN MEXICO

Month	Valle Redondo, Baja California				El Hongo, Baja California				El Carrizo, Baja California			
	1990		1974-1990		1990		1981-1990		1990		1980-1990	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	28.0	-2.0	32.0	-6.0	23.0	-5.0	25.0	-9.0	30.0	3.0	30.0	-1.0
Feb.	#	#	35.0	-5.0	27.0	-4.0	27.0	-6.0	26.0	1.0	34.0	-2.0
Mar.	#	#	32.0	-3.0	27.0	-1.0	29.0	-2.0	32.0	-4.0	32.0	-4.0
April	#	#	39.0	0	30.0	3.0	31.0	-1.0	30.0	7.0	41.0	4.0
May	#	#	41.0	4.0	31.0	2.0	38.0	1.0	38.0	8.0	42.0	5.0
June	#	#	45.0	5.0	41.0	5.0	41.0	2.0	42.0	11.0	42.0	9.0
July	#	#	44.0	9.0	38.0	14.0	42.0	7.0	38.0	8.0	43.0	8.0
Aug.	#	#	45.0	8.0	37.0	9.0	41.0	3.0	34.0	10.0	45.0	10.0
Sept.	#	#	46.0	-7.0	39.0	7.0	39.0	3.0	40.0	11.0	41.0	9.0
Oct.	#	#	46.0	4.0	32.0	7.0	35.0	0	35.0	12.0	38.0	6.0
Nov.	#	#	36.0	-2.0	28.0	2.0	29.0	-2.0	32.0	8.0	35.0	4.0
Dec.	#	#	33.0	-1.0	23.0	-7.0	27.0	-8.0	30.0	1.0	32.0	-3.0
Yearly			46.0	-7.0	41.0	-7.0	42.0	-9.0	42.0	-4.0	45.0	-4.0

Month	Belen, Baja California											
	1990		1965-1990									
	Max.	Min.	Max.	Min.								
Jan.	31.0	0	34.0	-6.0								
Feb.	28.0	0	32.0	-6.0								
Mar.	30.0	1.0	36.0	-4.0								
April	32.0	5.0	40.0	-3.0								
May	37.0	4.0	40.0	0								
June	43.0	7.0	43.0	3.0								
July	39.0	12.0	45.0	4.0								
Aug.	39.0	10.0	45.0	5.0								
Sept.	42.0	9.0	44.0	1.0								
Oct.	35.0	4.0	40.0	-6.0								
Nov.	30.0	0	34.0	-4.0								
Dec.	26.0	-4.0	33.0	-7.0								
Yearly	43.0	-4.0	45.0	-7.0								

Missing record

DRAINAGE AREAS ABOVE GAGING STATIONS AND IRRIGATED AREAS
ALONG TIJUANA RIVER AND TRIBUTARIES

1990

The total area within the Tijuana River basin is 4,483 square kilometres, as determined from the best available maps from both the United States and Mexico. The drainage areas shown below are tabulated according to their downstream sequence.

The irrigated areas, tabulated in downstream sequence, are from the most reliable sources available. Those in the United States were furnished by the Tijuana River Valley Association or estimated from aerial photographs. Those in Mexico were furnished by the Ministry of Agriculture and Hydraulic Resources of Mexico through the Mexican Section of the Commission. All irrigation in the Tijuana River basin in 1990 was by pumping from ground water.

Designation of Areas	Drainage Basin-Square Kilometres			Irrigated Areas-Hectares		
	United States	Mexico	Total	United States	Mexico	Total
Cottonwood Creek						
above Morena Dam	295	0	295	0	0	0
Morena Dam to Barrett Dam	344	0	344	0	0	0
above Barrett Dam	640	0	640	0	0	0
below Barrett Dam and above						
Tecate Creek	168	0	168	0	0	0
above Tecate Creek	808	0	808	0	0	0
Campo Creek						
above International Boundary	220	10	230	0	0	0
Tecate Creek						
above International Boundary						
(not including Campo Creek)	49	166	215	0	0	0
Cottonwood Creek						
above International Boundary						
Station	1,070	176	1,246	0	0	0
Rio de las Palmas						
above Rodríguez Dam	18	2,541	2,559	0	(b) 0	0
Tijuana River						
above Westor Gaging Station	1,186	3,279	4,465	119	0	119
above the Mouth	1,197	3,287	4,484	(a) 343	0	343

(a) Data from Otay Water District, leased areas from IBWC irrigation and private landowners.

(b) There was no irrigation in 1990 in the Tijuana Irrigation District, Tijuana Valley, Baja California Mexico, from the Rodríguez Reservoir.



09-5375.00 WHITewater DRAW NEAR DOUGLAS, ARIZONA

DESCRIPTION: Water-stage recorder located on U. S. Highway 80 bridge between Douglas and Bisbee, Arizona, about 137 metres upstream from the Southern Pacific Railroad bridge, 2.4 kilometres upstream from the international boundary, and 3.2 kilometres west of Douglas, Arizona. Zero of gage is 1,191.51 metres above mean sea level, U. S. C. & G. S. datum of 1929. Location April 26, 1972 to April 10, 1974 was 61 metres upstream from bridge. Datum 1.34 metres higher.

RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Computations by shifting control methods. Records obtained and furnished by the U. S. Section of the Commission. Records fair. Records available: August to October 1911 (gage heights and discharge measurements only), July to October 1912, January to June 1913, October 1913, December 1913 to June 1914, February to June 1915, October 1915 to September 1919, October 1919 to April 1922 (gage heights and discharge measurements only), July 1930 to December 1933, May 1935 to July 1947, October 1947 through 1990 (July 1954 to March 1955, monthly discharge only).

REMARKS: Diversions above this station are mainly by pumping from ground water for irrigation. Records show flow at the international boundary into Mexico except for some smelter waste water entering the stream a short distance below this station.

EXTREMES: Prior to 1936: Maximum recorded discharge, 97.7 m³/sec August 10, 1931 (gage height 3.70 metres); maximum estimated discharge, 115 m³/sec July 27, 1919; minimum discharge, no flow for several days of many years. Since 1936: Maximum discharge, 143 m³/sec August 7, 1955; maximum gage height, 5.04 metres July 29, 1966; minimum daily discharge, no flow at times during most years.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0	0	0	0.32	0	0.27	0	0
2	0	0	0	0	0	0	0	.61	.05	.67	0	0
3	0	0	0	0	0	0	0	.35	.02	.04	0	0
4	0	0	0	0	0	0	0	.23	0	0	0	0
5	0	0	0	0	0	0	0	.16	0	0	0	0
6	0	0	0	0	0	0	0	0	.45	0	0	0
7	0	0	0	0	0	0	0	0	.09	0	0	0
8	0	0	0	0	0	0	.13	0	.01	0	.11	0
9	0	0	0	0	0	0	0	0	.04	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	.39	0	0	0	0
13	0	0	0	0	0	0	0	.18	0	0	0	0
14	0	0	0	0	0	0	.15	.41	0	0	0	0
15	0	0	0	0	0	0	1.78	.23	0	0	0	0
16	0	0	0	0	0	0	.94	.92	0	0	0	0
17	0	0	0	0	0	0	.13	.54	.18	0	0	0
18	0	0	0	0	0	0	.12	.03	.23	0	0	0
19	0	0	0	0	0	0	.25	0	.01	0	0	0
20	0	0	0	0	0	0	.68	0	0	0	0	0
21	0	0	0	0	0	0	.42	0	0	0	0	0
22	0	0	0	0	0	0	.36	.13	0	0	0	0
23	0	0	0	0	0	0	.35	0	.01	0	0	0
24	0	0	0	0	0	0	.20	0	0	0	0	0
25	0	0	0	0	0	0	.15	0	0	0	0	0
26	0	0	0	0	0	0	.01	.05	0	0	.77	0
27	0	0	0	0	0	0	0	0	0	0	.15	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	.22	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	5.89	4.55	1.09	0.98	1.03	0
Current Year 1990										Period 1936-1990		
Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres				
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum	
Jan.	1.48	1.48	1	0	1	0	0	0	40.6	556	0	
Feb.	1.48	1.48	1	0	1	0	0	0	20.5	163	0	
Mar.	1.48	1.48	1	0	1	0	0	0	28.3	364	0	
April	1.48	1.48	1	0	1	0	0	0	20.8	213	0	
May	1.48	1.48	1	0	1	0	0	0	14.2	170	0	
June	1.48	1.48	1	0	1	0	0	0	135	1,961	0	
July	2.41	1.46	15	3.57	127	0	.19	509	2,126	10,004	0	
Aug.	2.16	1.46	17	1.55	1	0	.15	393	3,449	17,861	0	
Sept.	2.06	1.46	6	1.03	1	0	.04	94.2	899	3,910	0	
Oct.	2.01	1.46	2	.81	1	0	.03	84.7	425	7,528	0	
Nov.	2.15	1.46	26	1.48	1	0	.03	89.0	40.0	434	0	
Dec.	1.46	1.46	1	0	1	0	0	0	133	2,915	0	
Yearly	2.41	1.46		3.57		0	0.04	1,170	7,331	27,533	0	

! And other days

SEWAGE INFLUENT, DOUGLAS, ARIZONA
INTERNATIONAL TREATMENT PLANT

DESCRIPTION: Parshall flume in the influent line of the older trickling filter unit and a Parshall flume in the influent line of the newer extended aeration unit. The treatment plant is located about 1.6 kilometres west of the Douglas-Agua Prieta Port of Entry immediately adjacent to the international boundary in Douglas, Cochise County, Arizona.

RECORDS: Continuous monthly records since March 1948; daily records from March 18, 1948 through 1950 and from January 1952 through 1990.

REMARKS: The older 4.9 thousand cubic metres per day trickling filter unit was constructed in 1947 by the International Boundary and Water Commission. Since April 8, 1968 all sewage from Agua Prieta has been retained in Mexico to be used for irrigation along with the effluent from the Douglas International Treatment Plant. On July 1, 1973, ownership and operation of the plant was transferred from the International Boundary and Water Commission to the city of Douglas. In 1980 the plant was enlarged, with the addition of the extended aeration unit bringing the total capacity up to 9.8 thousand cubic metres per day. The effluent from the Douglas Treatment plant is discharged through closed conduit to Mexico.

Month	Total Monthly Flows			Mean Daily Flows—Thousand Cubic Metres Per Day					
	Thousand Cubic Metres			Current Year 1990			Period 1952-1990		
	U.S.	Mexico	Total	Maximum	Minimum	Mean	Maximum	Minimum	Mean
Jan.	158	0	158	6.4	3.7	5.1	8.2	1.6	4.2
Feb.	144	0	144	8.2	2.1	5.1	8.2	2.1	4.2
Mar.	159	0	159	8.0	2.2	5.1	8.0	2.2	4.2
April	154	0	154	6.1	4.4	5.1	7.7	1.4	4.2
May	159	0	159	6.0	7.0	5.1	7.0	1.9	4.3
June	155	0	155	7.5	3.2	5.2	7.8	2.1	4.4
July	159	0	159	6.2	4.2	5.1	12.1	1.8	4.6
Aug.	155	0	155	6.0	4.2	5.0	10.1	1.4	4.7
Sept.	151	0	151	6.4	4.1	5.0	8.0	1.8	4.5
Oct.	184	0	184	12.0	3.0	5.9	12.0	2.3	4.4
Nov.	153	0	153	10.9	2.1	5.1	10.9	1.2	4.3
Dec.	153	0	153	10.2	3.0	4.9	12.6	1.9	4.3
Yearly	1,884	0	1,884	12.0	2.1	5.1	12.6	1.2	4.4

09-4705.00 SAN PEDRO RIVER AT PALOMINAS, ARIZONA

DESCRIPTION: Water-stage recorder located near left bank on downstream side of the bridge pier at Highway 92, 1.1 kilometre east of Palominas, 4.0 kilometres upstream from Green Brush Draw, 7.2 kilometres downstream from international boundary, and 19 kilometres southwest of Bisbee, Arizona. Zero of gage is 1,276.39 metres above mean sea level (State Highway bench mark).

RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Records available: May 1930 to October 1933, May 1935 to July 1941, and July 1950 through 1990. Records obtained and furnished by U. S. Geological Survey to September 30, 1981; thereafter by the United States Section of the Commission.

REMARKS: There are some small diversions for irrigation of a few hundred acres above this station, mostly in Mexico. Record shows approximate flow of river at international boundary.

EXTREMES: Maximum daily discharge, 623 m³/sec on August 14, 1940 (gage height 4.93 metres present datum), from rating curve extended above 159 m³/sec on basis of slope-area measurement of peak flow; no flow at time in most years. Greatest flood known occurred on September 28, 1926 (gage height, about 7.28 metres present datum), from flood marks; discharge not determined.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.04	0.07	0.04	0.04	0	0	0	1.87	0.73	0.29	0.01	0.17
2	.04	.07	.05	.04	0	0	.04	1.50	3.29	1.50	.02	.17
3	.05	.06	.04	.04	0	0	0	1.00	.83	.79	.03	.16
4	.04	.07	.05	.03	0	0	0	2.86	.41	.27	.03	.16
5	.05	.07	.04	.04	0	0	0	.98	.40	.13	.04	.15
6	.05	.07	.04	.03	0	0	0	.37	.37	.10	.04	.16
7	.05	.07	.05	.03	0	0	.02	.27	.03	.08	.04	.15
8	.05	.06	.05	.03	0	0	0	.27	.03	.05	.04	.15
9	.05	.06	.05	.03	0	0	0	.26	.03	.04	.04	.15
10	.05	.05	.06	.02	0	0	0	.25	.03	.03	.04	.16
11	.05	.05	.05	.02	0	0	0	.27	.03	.02	.04	.16
12	.04	.05	.05	.02	0	0	0	.27	.03	.02	.04	.18
13	.05	.05	.05	.01	0	0	0	.27	.03	.01	.04	.19
14	.04	.06	.04	0	0	0	.63	.28	3.62	.01	.05	.18
15	.04	.06	.04	0	0	0	8.38	4.79	16.5	0	.05	.18
16	.04	.05	.04	0	0	0	25.5	12.1	3.65	.01	.06	.25
17	.04	.05	.04	0	0	0	5.01	3.65	1.64	.04	.07	.27
18	.04	.05	.04	0	0	0	1.23	1.07	.26	.04	.07	.24
19	.05	.05	.04	0	0	0	.75	.34	.05	.03	.08	.22
20	.05	.05	.04	0	0	0	4.73	.20	.05	.01	.08	.21
21	.05	.05	.04	0	0	0	5.07	.10	.05	.01	.09	.21
22	.04	.06	.04	0	0	0	2.95	.03	.05	.01	.09	.21
23	.05	.05	.04	0	0	0	.90	.01	.04	.01	.10	.20
24	.05	.05	.04	0	0	0	1.46	.01	.04	.01	.13	.20
25	.04	.05	.04	.01	0	0	2.49	.02	.05	.01	.15	.21
26	.05	.04	.04	.01	0	0	2.49	.02	.06	.01	.27	.18
27	.05	.04	.04	.01	0	0	.11	.03	.03	.01	.37	.22
28	.05	.04	.04	0	0	0	.11	.03	.02	0	.27	.27
29	.05	.04	.04	0	0	0	.11	.03	.01	0	.20	.25
30	.05	.04	.04	0	0	0	.08	.03	.04	0	.18	.21
31	.05	.04	.04	0	0	0	.04	.03	0	0	0	.20
Sum	1.44	1.55	1.34	0.41	0	0	62.10	33.21	32.40	3.54	2.76	6.02
Current Year 1990												
Period 1951-1990												
Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres				
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum	
Jan.	0.89	0.87	120	0.08	1	0.03	0.05	124	1,856	34,245		3.2
Feb.	.88	.86	16	.09	126	.04	.06	134	955	8,343		3.7
Mar.	.87	.86	10	.08	118	.03	.04	116	847	9,129		16.4
April	.87	.83	1	.05	113	0	.01	35.4	215	1,282	0	0
May	.84	.83	1	.01	1	0	0	0	77.8	502	0	0
June	.83	.83	1	0	1	0	0	0	171	1,716	0	0
July	2.40	.74	16	64.0	1	0	2.00	5,365	6,306	21,263	0	0
Aug.	2.07	.71	16	39.4	24	.01	1.07	2,869	10,057	44,860	204	0
Sept.	2.31	.72	15	56.4	129	0	1.08	2,799	2,412	20,160	13.9	0
Oct.	1.02	.71	2	1.98	115	0	.11	306	2,349	58,371	0	0
Nov.	.85	.72	27	.43	1	.01	.09	238	334	3,161	0	0
Dec.	.84	.79	16	.37	1	.14	.19	520	2,029	31,428	7.6	0
Yearly	2.40	0.71		64.0		0	0.40	12,506	27,609	77,448	5,427	

! And other days

09-4800.00 SANTA CRUZ RIVER NEAR LOCHIEL, ARIZONA

DESCRIPTION: Water-stage recorder located in the United States near left bank on the downstream side of concrete bridge pier of county highway bridge, 4.0 kilometres northeast of Lochiel, Arizona, and 2.7 kilometres upstream from the international land boundary. The elevation of the zero of the gage has not been determined, but topographic maps indicate the elevation of the stream bed at the gage is about 1,408 metres.

RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Records obtained and furnished by the U. S. Geological Survey. Records available: January 1949 through 1990.

REMARKS: There are small diversions by ground water pumping for irrigating about 80.9 hectares above this station. EXTREMES: Maximum discharge, 362 m³/sec on August 15, 1984 (gage height 3.19 metres); minimum discharge, no flow for several days of many years.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.03	0.03	0.02	0.01	0.01	0	0.01	0.12	0.12	0.02	0	0.03
2	.03	.03	.02	.01	.01	0	.01	.09	.12	.01	0	.03
3	.03	.03	.02	.01	.01	.01	.02	1.02	.12	.01	0	.03
4	.03	.03	.02	.01	.01	.01	.01	.16	.12	.01	0	.03
5	.03	.03	.02	.01	.01	.01	.01	.12	.12	.01	0	.03
6	.03	.03	.02	.01	.01	.01	.01	.11	.12	.01	0	.03
7	.03	.03	.02	.01	.01	.01	.01	.11	.11	.01	0	.03
8	.03	.03	.02	.01	.01	.01	.02	.10	.10	.01	0	.03
9	.03	.03	.02	.01	.01	.01	.01	.10	.09	0	0	.03
10	.03	.03	.02	.01	.01	.01	.01	.09	.08	0	0	.03
11	.03	.03	.02	.01	.01	.01	.42	.08	.08	0	0	.03
12	.03	.03	.02	.01	.01	.01	.13	.16	.08	0	0	.03
13	.03	.03	.02	.01	.01	.01	.05	.15	.07	0	0	.03
14	.03	.03	.02	.01	.01	.01	.02	.18	.11	0	0	.03
15	.03	.03	.02	.01	.01	.01	.05	.91	.12	0	0	.03
16	.03	.03	.02	.01	.01	.01	1.56	.31	.07	0	0	.04
17	.03	.03	.02	.01	.01	.01	5.04	.22	.07	0	0	.03
18	.03	.03	.02	.01	.01	.01	.15	.21	.07	0	0	.03
19	.03	.03	.02	.01	.01	.01	.06	.19	.07	0	0	.03
20	.03	.03	.02	.01	.01	.01	.05	.18	.06	0	0	.03
21	.03	.02	.02	.01	.01	.01	1.30	.18	.06	0	0	.04
22	.03	.02	.02	.01	.01	.01	.16	.16	.06	0	0	.03
23	.03	.02	.02	.01	.01	.01	.13	.16	.06	0	0	.03
24	.03	.02	.01	.01	.01	.01	.04	.15	.06	0	0	.03
25	.03	.02	.01	.01	.01	.01	.03	.14	.05	0	0	.03
26	.03	.02	.01	.01	.01	.01	.03	.14	.05	0	.04	.03
27	.03	.02	.01	.01	.01	.01	.03	.14	.05	0	.04	.04
28	.03	.02	.01	.01	.01	.01	.03	.13	.05	0	.03	.04
29	.03	.01	.01	.01	.01	.01	.02	.13	.05	0	.03	.04
30	.03	.01	.01	.01	.01	.01	.02	.13	.07	0	.03	.04
31	.03		.01		0	.01	.02	.12		0		.04
Sum	0.93	0.76	0.54	0.30	0.30	0.28	9.46	6.19	2.46	0.09	0.17	1.00
Current Year 1990												
Period 1949-1990												
Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres				
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum	
Jan.			1	0.03	1	0.03	0.03	80.4	196	3,571		1.6
Feb.			1	.03	121	.02	.03	65.7	113	1,233		2.2
Mar.			1	.02	124	.01	.02	46.7	137	2,594		.9
April			1	.01	1	.01	.01	25.9	52.8	380	0	
May			1	.01	31	0	.01	25.9	29.0	210	0	
June			1	.01	1	0	.01	24.2	21.5	208	0	
July			17	5.04	1	.01	.31	817	631	5,267		2.0
Aug.			3	1.02	11	.08	.20	535	1,287	14,207		.1
Sept.			1	.12	0	.05	.08	213	395	3,249	0	
Oct.			1	.02	19	0	0	7.8	382	5,837	0	
Nov.			126	.04	1	0	.01	14.7	77.5	497	0	
Dec.			116	.04	1	.03	.03	86.4	139	1,348	0	
Yearly				5.04		0	0.06	1,943	3,461	21,433	155	

☐ Mean daily

! And other days

09-4805.00 SANTA CRUZ RIVER NEAR NOGALES, ARIZONA

DESCRIPTION: Water-stage recorder, cable with sit-down cable car located 8.9 kilometres east of Nogales, Arizona, 1.3 kilometre downstream from the international boundary and 9.7 kilometres upstream from the Santa Cruz bridge on State Highway No. 82. Zero of gage is 1,128.53 metres above mean sea level, U. S. C. & G. S. datum (levels by International Boundary and Water Commission).

RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Records obtained and furnished by the U. S. Geological Survey. Records available: March to November 1907 and April 1909 to December 1912 (discharge measurements and fragmentary gage height record); January 1913 to June 1922 (October 1915 to September 1916, monthly discharges only); May 1930 to December 1933; and July 1935 through 1990.

REMARKS: Diversions in both countries affect the flow at this station. The major diversions occur in Mexico for domestic and irrigation uses. There are no storage dams above the station as of December 1990.

EXTREMES: Maximum discharge, 949 m³/sec on October 9, 1977 (gage height 4.72 metres); minimum discharge, no flow for several days of many years.

MEAN DAILY DISCHARGE IN CUBIC METRES PER SECOND 1990 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.03	0.03	0.03	0.02	0.01	0	0	1.05	5.30	0.68	0.26	0.26
2	.04	.04	.03	.02	.02	0	.02	1.98	3.12	.82	.27	.25
3	.05	.03	.02	.02	.02	0	0	2.92	1.67	.62	.26	.23
4	.04	.03	.02	.02	.02	0	0	3.23	1.13	.51	.24	.22
5	.04	.03	.02	.02	.02	0	0	2.46	1.19	.48	.24	.20
6	.04	.03	.02	.02	.01	0	0	1.64	.85	.45	.24	.18
7	.03	.03	.02	.02	.01	0	0	1.22	.68	.45	.24	.18
8	.03	.03	.02	.02	.01	0	0	1.05	.54	.45	.23	.18
9	.03	.03	.02	.02	.01	0	0	.99	.42	.42	.22	.18
10	.03	.02	.02	.02	.01	0	1.95	.91	.34	.40	.22	.17
11	.03	.02	.03	.01	.01	0	1.16	.74	.28	.37	.22	.18
12	.03	.02	.03	.01	.01	0	.51	1.08	.26	.37	.21	.18
13	.03	.03	.03	.01	.01	0	.01	.79	.23	.37	.22	.18
14	.03	.03	.03	.01	.01	0	5.07	.82	26.2	.37	.24	.17
15	.03	.03	.03	.01	.01	0	14.5	.79	8.27	.37	.24	.17
16	.03	.03	.03	.01	.01	0	14.0	2.35	3.65	.37	.25	.27
17	.03	.03	.03	.01	.01	0	4.56	2.15	1.78	.37	.25	.24
18	.03	.03	.03	.01	.01	0	4.64	1.27	1.10	.34	.26	.20
19	.03	.03	.03	.01	.01	0	2.89	.88	.76	.34	.27	.20
20	.03	.03	.03	.01	.01	0	1.70	.74	.62	.31	.28	.20
21	.03	.03	.03	.01	0	0	17.3	.68	.59	.28	.31	.21
22	.03	.03	.03	.01	0	0	5.69	.59	.57	.26	.31	.23
23	.03	.03	.03	.01	0	0	4.02	.51	.57	.28	.31	.22
24	.03	.03	.03	.02	0	0	3.79	.42	.54	.28	.34	.21
25	.03	.03	.02	.02	0	0	3.62	.40	.57	.27	.34	.21
26	.03	.03	.02	.02	0	0	3.40	.37	.54	.25	.40	.22
27	.03	.03	.02	.02	0	0	2.49	.40	.51	.25	.37	.24
28	.03	.03	.02	.02	0	0	1.56	.51	.45	.24	.34	.37
29	.03	.02	.02	.02	0	0	1.10	.48	.45	.24	.25	.40
30	.03	.02	.01	.01	0	0	.99	.76	1.30	.25	.25	.40
31	.03	.02			0		.91	11.7		.24		.31
Sum	0.99	0.82	0.78	0.46	0.24	0	95.88	45.88	64.48	11.70	8.08	7.06

Current Year 1990

Period 1936-1990

Month	Extreme Gage Metres		Extreme-Cubic Metres per Second				Average	Volume-Thousands of Cubic Metres			
	High	Low	Day	# High	Day	# Low		Total	Average	Maximum	Minimum
Jan.			3	0.05	1	1	0.03	85.5	2,572	37,352	0
Feb.			2	.04	1	0	.02	70.8	2,047	25,344	0
Mar.			1	.03	1	3	.02	67.4	1,745	24,145	0
April			1	.02	1	1	.01	39.7	469	3,645	0
May			1	.02	1	2	0	20.7	142	1,272	0
June			1	0	1	1	0	0	104	1,787	0
July			21	17.3	1	1	0	3.09	8,284	3,402	19,255
Aug.			31	11.7	26		.37	1.48	3,964	6,897	56,481
Sept.			14	26.2	13		.23	2.15	5,571	1,967	111,633
Oct.			2	.82	128		.24	.38	1,011	2,391	72,806
Nov.			26	.40	12		.21	.27	698	666	9,108
Dec.			129	.40	110		.17	.23	610	3,045	41,405
Yearly				26.2		0	0.65	20,422	25,447	108,071	2,756

Mean daily

! And other days

SEWAGE INFLUENT, NOGALES INTERNATIONAL TREATMENT PLANT

DESCRIPTION: Three 61-centimetre Parshall flumes, each with a water-stage recorder and continuous totalizer, one located at the international boundary for measuring effluent from Nogales, Sonora, one located at the head of the treatment plant, and one in the plant effluent line. Nogales International Treatment Plant is located adjacent to I-19, approximately 14.5 kilometres north of the international boundary, all within the city of Nogales, Santa Cruz County, Arizona.

RECORDS: Flows from the United States are deduced from total plant influent less the flows measured crossing the international boundary from Mexico. Records available: Continuous monthly record for plant influent since August 1951; daily records for plant influent, January 1952 through 1990.

REMARKS: Prior to December 18, 1971 the plant was located along the right bank of Nogales Wash, approximately 3.2 kilometres north of the international boundary. Nogales International Treatment Plant treats combined sewage from both Nogales, Arizona and Nogales, Sonora by means of aerated stabilization lagoons with a capacity of 31.0 thousand cubic metres per day. Chlorinated plant effluent is discharged directly to the Santa Cruz River.

Month	Total Monthly Flows			Mean Daily Flows—Thousand Cubic Metres Per Day					
	Thousand Cubic Metres			Current Year 1990			Period 1952-1990		
	U.S.	Mexico	Total	Maximum	Minimum	Mean	Maximum	Minimum	Mean
Jan.	471	757	1,228	41.6	35.0	39.6	51.1	2.5	16.3
Feb.	375	651	1,026	43.1	34.0	36.6	55.7	2.5	16.9
Mar.	384	708	1,092	37.4	33.0	35.2	71.4	2.8	16.7
April	418	590	1,008	36.7	30.1	33.6	42.9	2.6	15.9
May	376	601	977	34.3	28.6	31.5	36.7	2.1	15.1
June	350	463	813	30.8	24.0	27.1	34.1	2.6	14.1
July	410	547	957	41.6	25.0	30.9	51.7	2.6	15.0
Aug.	463	548	1,011	38.7	27.2	32.6	49.7	2.8	16.5
Sept.	504	519	1,023	42.3	25.9	34.1	46.6	3.0	17.5
Oct.	605	662	1,267	44.0	36.0	40.9	76.3	2.6	17.5
Nov.	483	740	1,223	44.3	36.9	40.8	44.3	3.0	16.9
Dec.	647	725	1,372	59.0	36.5	44.3	59.1	1.3	17.0
Yearly	5,486	7,511	12,997	59.0	24.0	35.6	76.3	1.3	16.3

WESTERN BOUNDARY WATER BULLETIN - 1990 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

RAINFALL ON THE SANTA CRUZ RIVER WATERSHED
IN MILLIMETRES

Tabulated below are the monthly records of rainfall with averages for their periods of record at stations located in Arizona. Two stations are operated and maintained by the United States Section of the Commission and two by the National Weather Service. For location, elevation, period of record, type of gage in use, and the observer, see alphabetical listing of stations on this page.

IN THE UNITED STATES

Month	San Rafael #2, Arizona		Canelo, Arizona		Patagonia, Arizona		Nogales Sanitation Plant 9N, Arizona			
	1990	Average 1973-1990	1990	Averages 1930-1990	1990	Averages 1930-1990	1990	Averages 1953-1990		
Jan.	22	40	17	30	30	32	13	29		
Feb.	20	31	21	27	23	27	33	20		
Mar.	9	30	7	22	10	23	6	22		
April	8	14	9	11	4	10	9	8		
May	65	8	6	4	7	5	1	6		
June	50	15	20	19	21	12	11	10		
July	0	122	173	107	190	113	231	124		
Aug.	65	94	148	108	120	104	89	99		
Sept.	50	58	53	45	62	45	67	43		
Oct.	0	39	24	27	18	29	24	36		
Nov.	22	23	22	20	26	20	13	16		
Dec.	94	37	49	35	58	36	49	36		
Yearly	405	511	549	455	569	456	546	449		

LOCATION OF RAINFALL STATIONS ON THE SANTA CRUZ RIVER WATERSHED

The precipitation records of the stations listed alphabetically below begin on the date shown and extend through 1990.

IN THE UNITED STATES

NAME OF STATION	TYPE GAGE	LATITUDE	LONGITUDE	ELEV. (Metres)	RECORD BEGAN	OBSERVER
Canelo, Arizona	S	31° 33'	110° 32'	1,527	1930	R. E. Ewing
Nogales Sanitation Plant 9N, Arizona	S	31° 25'	110° 57'	1,085	June 1952	I. B. & W. C.
Patagonia, Arizona	S	31° 33'	110° 45'	1,277	1930	George R. Proctor
San Rafael #2, Arizona	S	31° 22'	110° 38'	1,481	Jan. 1973	I. B. & W. C.

S Standard 203 millimetre rain gage

TEMPERATURE IN THE SANTA CRUZ RIVER BASIN
IN DEGREES CELSIUS

Tabulated below are monthly records of temperature at the station located at the Nogales Sanitation Plant in Arizona 14.5 kilometres north of the international boundary. On December 18, 1971, the station was moved to correspond with a new Nogales Sanitation Plant. Prior to this date, the station was located 3.2 kilometres north of the international boundary at the old Nogales Sanitation Plant. This station is operated and maintained by the United States Section of the Commission. The equipment at the Nogales Sanitation Plant - 9N consists of a standard 203 millimetres rain gage and maximum and minimum thermometer. The collection of data for mean relative humidity, evaporation, and mean wind speed was discontinued in 1984.

For specific location of this station, refer to data opposite same station name shown in "Location of Rainfall Stations," in this bulletin.

Month	Nogales Sanitation Plant - 9N		
	1990		
	Mean	Max.	Min.
Jan.	6.9	26.7	-7.8
Feb.	8.3	27.8	-8.9
Mar.	12.1	30.0	-7.2
April	16.3	32.8	1.1
May	18.8	37.2	2.8
June	26.4	44.4	7.2
July	25.4	40.0	15.0
Aug.	23.5	35.0	10.0
Sept.	23.1	36.1	7.2
Oct.	17.6	31.7	-0.6
Nov.	12.4	28.9	-5.6
Dec.	7.4	23.3	-10.6
Yearly	16.5	44.4	-10.6

DRAINAGE AREAS ABOVE GAGING STATIONS AND IRRIGATED AREAS ALONG
SANTA CRUZ RIVER, SAN PEDRO RIVER, AND WHITEWATER DRAW

1990

The drainage basin areas tabulated below are derived from the best available maps from both the United States and Mexico.

Data on irrigated areas in the Whitewater Draw Basin were furnished by the Soil Conservation Service at Douglas, Arizona and estimated from aerial photographs.

Designation of Areas	Drainage Basin-Square Kilometres			Irrigated Areas-Hectares		
	United States	Mexico	Total	United States	Mexico	Total
Santa Cruz River:						
Above Lochiel, Arizona Gaging Station	212	0	212	40	0	40
Above El Cajon, Mexico Gaging Station	464	324	788	40	952	992
Above Nogales, Arizona Gaging Station	479	901	1,380	40	1,091	1,131
San Pedro River:						
Above Palominas, Arizona Gaging Station	239	* 1,621	1,859	578	1,400	1,978
Whitewater Draw:						
Above Douglas, Arizona Gaging Station	2,650	0	2,650	N/A	0	N/A

* An additional 122 square kilometres in Mexico is tributary to the San Pedro River downstream from this station.

N/A Not available.